

VI Reference

CDX Series Starter Kit for LabVIEW

VI Reference



OPTEX FA CO., LTD.

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Overview

The CDX Series Starter Kit for LabVIEW is a collection of drivers and samples for use with the high-precision laser-displacement sensor CDX series LabVIEW of Optex FA Co., Ltd. Use of the drivers detailed herein makes it possible to build applications with no worries about aspects such as setting command formats.

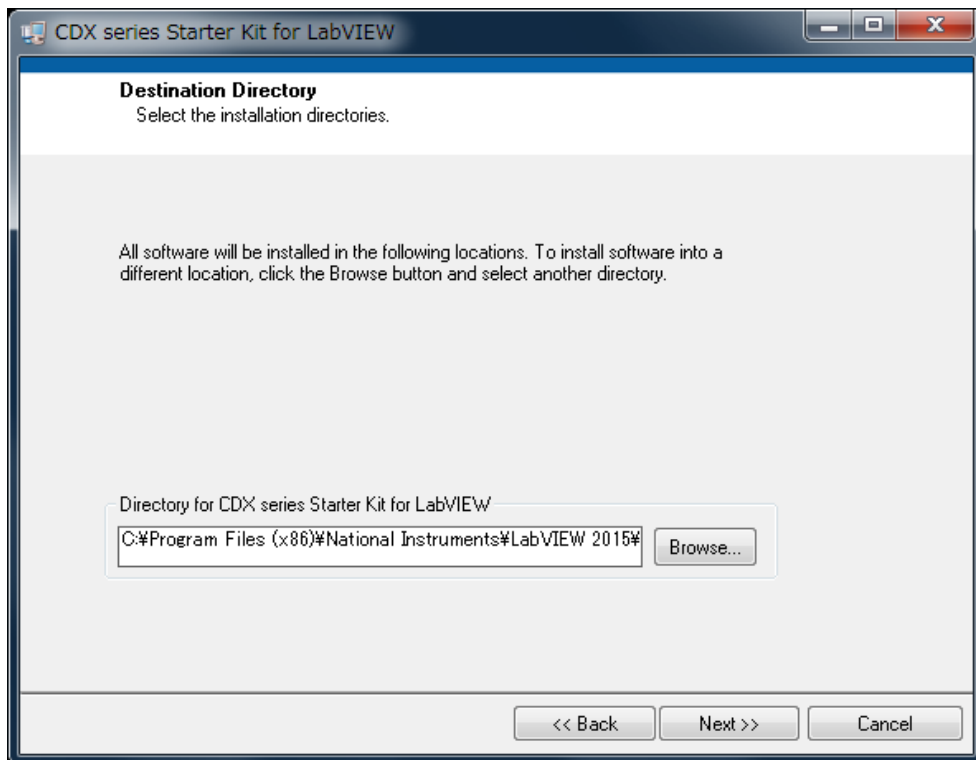
Operating Environment

Please check that software installed in your personal computer satisfied the conditions below.

OS	Windows XP SP3 or higher
LabVIEW version	LabVIEW2015 SP1 or higher

Installing CDX Series Starter Kit for Lab

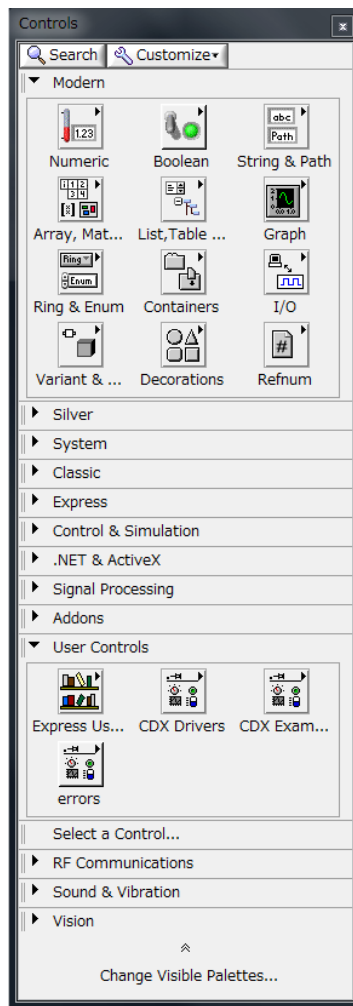
Run “setup.exe” in the CD-ROM and follow the instruction to install the kit. For the installation directory, select the user.lib in the directory in the LabVIEW version you are using.



Checking Installation

Check that CDX Series Starter Kit for LabVIEW has been properly installed. Start up LabVIEW and check that the two icons below have been added to the function pallet user library.

1. CDX Drivers
2. CDX Examples



Uninstalling CDX Series Starter Kit for LabVIEW

Open “Add and delete programs” on the control panel, select “CDX Series Starter Kit for LabVIEW” and delete. (The system does not need to be rebooted after uninstallation.)

VI List

Command names in the English version of the User's Manual are used for VI names. Each command features a read and write command.

VI Name	Category	Details
VI Tree		VIs included in the Starter Kit are arranged in diagram format.
Sub		
TCP Open		Performs initialization processing to establish connection to the CDX series.
TCP Close		Performs termination processing to shut down connection.
UDP Open		Performs initialization processing to build a connection for continuous transmission.
UDP Close		Performs termination processing to shut down the connection for continuous transmission.
Command		
Sensor status /measurement result		
Channel output status	R	Acquires the output status of each channel.
Sensor status output	R	Acquires the sensor output status.
Measurement value		
Channel output	R	Acquires the measured value of each channel.
Measurement		
Sampling period	R/W	Sets and acquires the time taken for one measurement.
Measurement range	R/W	Sets and acquires the measurement range when a maximum velocity of "12.5" μ sec is set by the sampling period command.
Upper Limit	R/W	Sets and acquires the maximum sampling cycle adjusted when "Auto" is selected by the sampling period command.
Lower Limit	R/W	Sets and acquires the minimum sampling cycle adjusted when "Auto" is selected by the sampling period command.
Measuring object	R/W	Sets and acquires targets for measurement.
Synchronization mode	R/W	Sets and acquires measurement functions for measurement with two sensor heads synchronized.
Detection order	R/W	Sets and acquires the side (near or far side) from which numbers are allocated to the sensor head when multiple reflected lights are received.

VI Name	Category	Details
Light distribution and Mask settings		
Waveform mask ON/OFF	R/W	Sets and acquires ON/OFF for the masking function for non-measurement within the measurement range.
Mask position	R/W	Sets and acquires the range of masking for non-measurement at four positions within the measurement range.
Input setting		
Polarity	R/W	Sets and acquires the external input terminal polarity.
Action	R/W	Sets and acquires the external input terminal operation.
Debouncing	R/W	Sets and acquires the time delay between when external input is switched ON to when actual operation takes place.
Measurement /output settings		
Channel usage	R/W	Sets and acquires channel use/non-use.
Measurement method	R/W	Sets and acquires the content of measurement.
Peak number	R/W	Sets and acquires the surface at which the target is measured (peak number).
Thickness peak No	R/W	Sets and acquires the surface where the distance (thickness) from the surface selected by the measurement peak number to the surface set by this item (thickness) is measured when "thickness" has been selected by the measurement method command.
Median filter	R/W	Sets and acquires the median filter value that cuts sudden changes in measured values to prevent variations.
Moving average	R/W	Sets and acquires measured value averaging processing.
Edge measurement	R/W	Sets and acquires comparison of the current measured value with the before measured value of the specified sampling count.
Hold mode	R/W	Sets and acquires the mode for extracting measured values specified as maximum and minimum within a certain period.
Hold operation	R/W	Sets and acquires hold reset input in the hold period or at auto-peak or auto-bottom.
Measurement value upper threshold	R/W	Sets and acquires the upper threshold value for output ON/OFF judgment.
Measurement value lower threshold	R/W	Sets and acquires the lower threshold value for output ON/OFF judgment.
Hysteresis	R/W	Sets and acquires the hysteresis value that gives latitude to the output ON-to-OFF value after the threshold value has been exceeded.

VI Name	Category	Details
Offset value	R/W	Sets and acquires the required value to be added to the value before multiplication by the span value (multiplication) command.
Span value (multiplication)	R/W	Sets and acquires the required value to multiply the measured value.
Offset value (to be added)	R/W	Sets and acquires the required value to be added to the value multiplied by the span value (multiplication) command.
Span teaching	R/W	Sets and acquires the span value based on the actual measured value.
Executing teaching	R/W	Sets and acquires execution of offsetting and span teaching.
One shot	R/W	Sets and acquires one-shot to switch output OFF after it has been switched ON only for the time set by the OFF delay time command.
ON delay time	R/W	Sets and acquires the ON-delay time until output is actually switched ON after the measured value exceeds the threshold value.
OFF delay time	R/W	Sets and acquires delay for the time until output is switched OFF when the measured value falls below the threshold value from the output-ON status.
Alarm	R/W	Sets and acquires the actual measured value display method when measurement becomes impossible.
Clamp value at alarm detection	R/W	Sets and acquires the value displayed when an alarm is generated when "clamp" or "delay clamp" is set by the alarm command.
Number of alarm delay measurements	R/W	Sets and acquires period during which operation is put into hold status as a sampling count when "delay clamp" is set by the alarm command.
Alarm recovery	R/W	Sets and acquires the period from alarm status until restoration of the measurement-possible status as a sampling count when "delay clamp" is set by the alarm command.
Device setting		
Mounting	R/W	Sets and acquires the sensor head mounting method.
Direction	R/W	Sets and acquires the measured value increment/decrement direction taking the measurement center as 0.
Laser ON/OFF	R/W	Sets and acquires laser emission ON/OFF.
Current time	R	Acquires the current time on the clock in the sensor.
Boot time	R	Acquires the startup time of the clock in the sensor.
Sensor time	R/W	Sets and acquires the time reflected in the current time command.
Changing the time setting	W	Sets the current time in the sensor.
Factory Reset	W	Returns all settings except the Ethernet communication setting to the factory setting status.

VI Name	Category	Details
Communication		
Input terminal setting	R/W	Sets and acquires input terminal operation matched to the connection target.
MAC Address	R	Acquires the MAC address registered in the main body.
IP address	R	Acquires the main body IP address.
Subnet mask	R/W	Sets and acquires the subnet mask of the main body.
Default gateway	R/W	Sets and acquires the default gateway of the main body.
Precision Timesync	R/W	Sets and acquires high-precision synchronization of clocks between sensors using a single unit as the time server when multiple CDX series units are used.
Storage setting		
Storage accumulation count	R	Acquires the number of data stored.
Storage status	R	Acquires the storage function operation status.
Storage control	R/W	Sets and acquires storage operation.
Quota	R/W	Sets and acquires the number of data stored by a single storage operation.
Rate	R/W	Sets and acquires the interval at which measured data is stored.
Start condition	R/W	Sets and acquires trigger conditions for the start of the storage.
Threshold	R/W	Sets and acquires the threshold value used when a threshold value is selected by the start condition command.
Trigger channel	R/W	Sets and acquires the start-trigger target channel for the start of storage.
Start position	R/W	Sets and acquires the time by which the start of storage is adjusted after start conditions have been satisfied as a sampling count.
Repeat	R/W	Sets and acquires operation after storage operation has been performed.
File system free space	R	Acquires the free space in the file system.
File system capacity	R	Acquires the total space in the file system.
Information		
Firmware version	R	Acquires the main body firmware version.
Software version	R	Acquires the main body software version.
Temperature	R	Acquires the temperature in the sensor head.
Total operating time of sensor	R	Acquires the total operating time with the sensor power supply on.
Operating time of laser	R	Acquires the total sensor laser emission operating time.

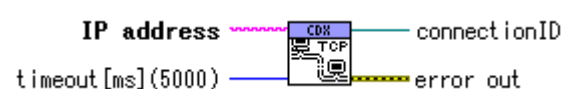
VI Name	Category	Details
Other		
Acquiring measured values with time data	R	Acquires measured values with time data.
Obtaining received light waveforms	R	Acquires the received-light waveform.
Individual sensor description	R/W	Sets and acquires descriptions of individual sensors.
Setting the reception port and IP address	W	Sets the continuous transmission reception IP address and port number.
Setting the transmission channels	W	Sets the continuous transmission channel.
Continuous transmission data format	R	Acquires continuous transmission data.

Description of VIs



sub

TCP Open

Performs initialization processing to establish connection to the CDX series.



Input

	IP address	CSV series IP address (e.g.: 192.168.0.10) setting
	timeout[ms]	Timeout (in milliseconds) setting

Output


	connectionID	Connection ID output
	error out	Error cluster output

TCP Close

Performs termination processing to shut down connection.

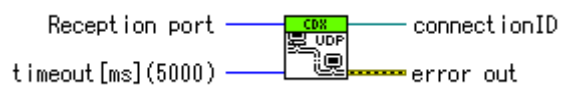


Input



	connectionID	Connection ID input
	error in	Error cluster input

UDP Open

Performs initialization processing for continuous transmission data connection.



Input

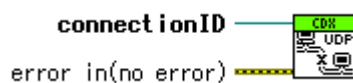
	Reception port	PC communication port setting
	timeout[ms]	Timeout (in milliseconds) setting

Output


	connectionID	Connection ID output
	error out	Error cluster output

UDP Close

Performs termination processing to shut down the continuous transmission data connection.



Input

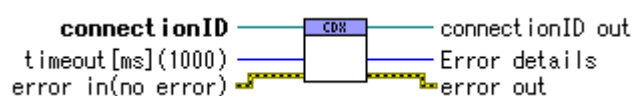
	connectionID	Connection ID input
	error in	Error cluster input

Commands




Command names in the English version of the User's Manual are used for VI names. To download the English version of the User's Manual, switch the screen to English notation using the CDX Seeker.

For detailed descriptions of each function, see the User's Manual.




Each IV has common I/O terminals.



Input

	connectionID	Connection ID input
	timeout[ms]	Timeout (in milliseconds) setting
	error in	Error cluster input

Output

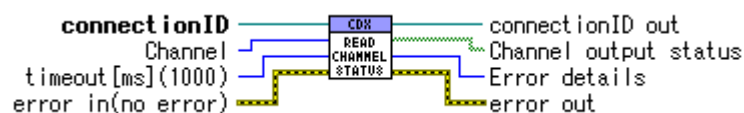
	connectionID	Connection ID output
	Error details	Returns an error code when a command error occurs. 0x00E1: A non-existent command has been specified. 0x00E2: The specified address is out of range. 0x00E9: Response data overflow
	error out	Error cluster output

Sensor status/measurement result

Channel output status

•Readout

Acquires the output status of each channel.



Input



Channel

Selects the channel.

Ch1/Ch2/Ch3/Ch4

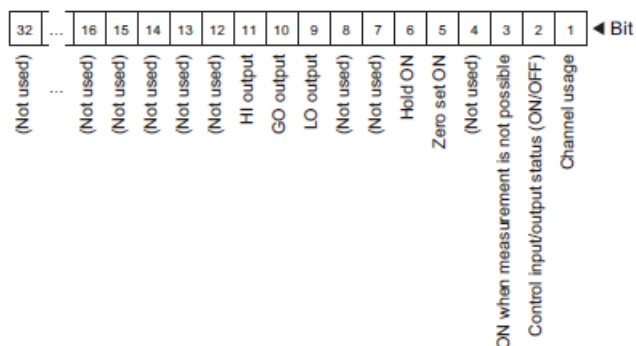
Output



Channel output status

Returns the channel output status.

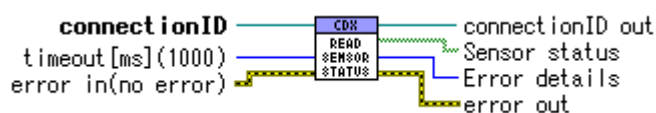
*1: Explanation of bits



Sensor status output

•Readout

Acquires the sensor output status.



Output



Sensor status

Returns the sensor output status.

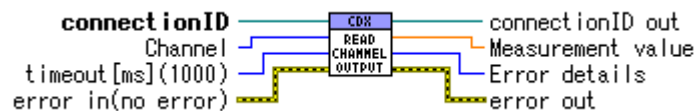
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	◀ Bit
(Not used)	ON when the laser is emitted	ON when storage file area is full	ON when precision timesync is in operation	On for alarm status	(Not used)	(Not used)	Input terminal status	(Not used)	(Not used)	(Not used)	(Not used)	Ch4 control input/output	Ch3 control input/output	Ch2 control input/output	Ch1 control input/output	(Not used)	(Not used)	(Not used)	(Not used)	(Not used)	Ch1 HI output	Ch1 GO output	Ch1 LO output	(Not used)	(Not used)	Ch1 hold ON	Ch1 zero set ON	(Not used)	ON when measurement for Ch1 is not possible	Ch1 control input/output status (ON/OFF)	(Usually ON)	

Measurement value

Channel output (Measured value)

- Readout

Acquires measured values from each channel.



Input



Channel

Selects the channel.

Ch1/Ch2/Ch3/Ch4

Output



Measurement value

Returns measurement values using the units below.

Displacement measurement [mm]

Thickness measurement [mm]

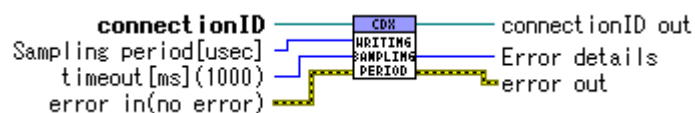
Velocity measurement [mm/s]

Measurement (Measurement settings)

Sampling period (Sampling cycle)

•Write

Sets the time taken for a single measurement.



Input



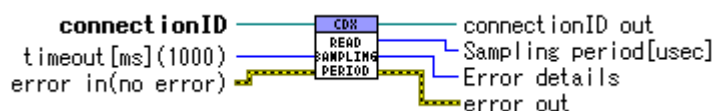
Sampling period[usec] Selects the sampling period.

12.5/25/50/100/200/500/1000/Auto

When Auto is set, the upper and lower limits are set by the "Upper Limit" and "Lower Limit" commands.

•Readout

Acquires the time taken for a single measurement.



Output



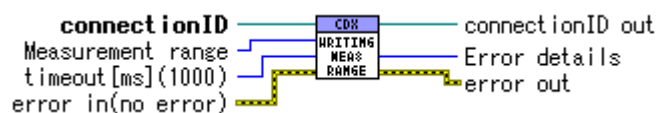
Sampling period[usec] Returns the set sampling period.

12.5/25/50/100/200/500/1000/Auto

Measurement range

•Write

Setting of a maximum velocity of “12.5” μ sec by the sampling period command narrows the measurement range. This command sets the setting range for this situation. The measurement range differs depending on the product.

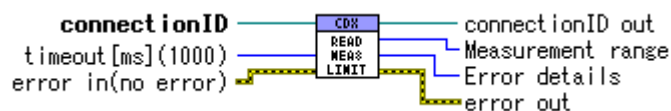


Input

U32 Measurement range Selects the measurement range.
Near/Center/Far

•Readout

Acquires the measurement range when a maximum velocity of “12.5” μ sec is set by the sampling period command.



Output

U32 Measurement range Returns the set measurement range.
Near/Center/Far

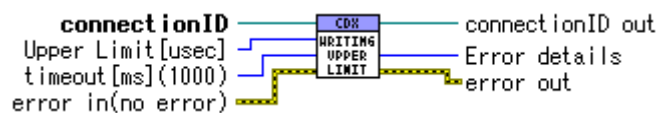
	Measurement Ranges			
	CDX-L[W]15	CDX-[W]30	CDX-[W]85	CDX-[W]150
Near	14.0 - 14.6mm	25.0 - 28.1mm 22.5 - 24.0mm *	65.0 - 77.7mm 71.5 - 74.3mm *	110.0 - 134.4mm
Center	14.4 - 15.4mm	27.8 - 31.9mm 22.8 - 27.9mm *	73.5 - 90.8mm 70.6 - 86.9mm *	124.8 - 166.3mm
Far	15.3 - 16.0mm	31.1 - 35.0mm 26.7 - 28.5mm *	84.8 - 105.0mm 81.0 - 91.5mm *	150.2 - 190.0mm

* With specular reflection mounted

Upper Limit (Upper sampling cycle limit)

•Write

Sets the maximum adjusted sampling period when “Auto” is selected by the sampling period command.

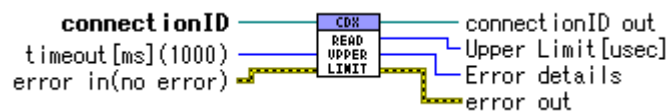


Input

U32 Upper Limit[usec] Selects the upper sampling period limit.
25/50/100/200/500/1000

•Readout

Acquires the maximum adjusted sampling period when “Auto” is selected by the sampling period command.



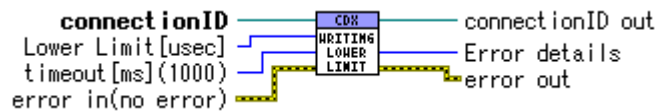
Output

U32 Upper Limit[usec] Returns the set upper sampling period limit.
25/50/100/200/500/1000

Lower Limit (Lower sampling cycle limit)

•Write

Sets the minimum adjusted sampling period when “Auto” is selected by the sampling period command.

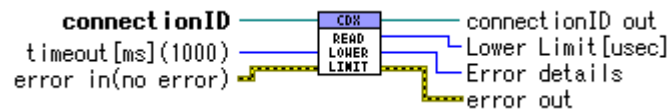


Input

U32 Lower Limit[usec] Selects the lower sampling period limit.
25/50/100/200/500/1000

•Readout

Acquires the minimum adjusted sampling period when “Auto” is selected by the sampling period command.



Output

U32 Lower Limit[usec] Returns the set lower sampling period limit.
25/50/100/200/500/1000

Measuring object (Target for measurement)

•Write

Sets the target for measurement.



Input



Measuring object

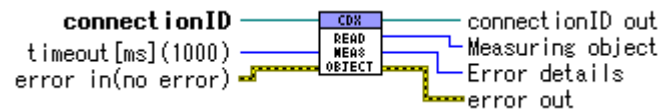
Selects the target for measurement.

Thin Glass/Standard

Select "Thin Glass" for measurement of the displacement and thickness of items such as thin glass plates.

•Readout

Acquires the target for measurement.



Output



Measuring object

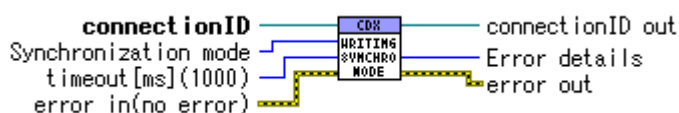
Returns the set target for measurement.

Thin Glass / Standard

Synchronization mode (Synchronous measurement)

•Write

Sets the actual measurement function for measurement with two sensor heads synchronized.



Input

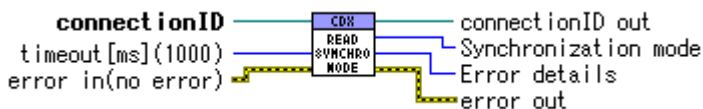


Synchronization mode Selects the synchronization setting.

None/Synchronous/Anti interfere 1/Anti interfere 2

•Readout

Acquires the actual measurement function for measurement with two sensor heads synchronized.



Output



Synchronization mode Returns the set synchronization setting.

None/Synchronous/Anti interfere 1/Anti interfere 2

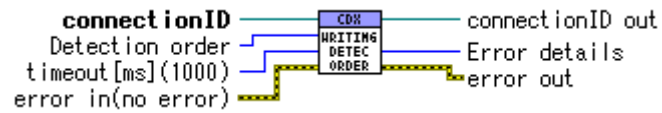
No setting: The function is not used.

Synchronous: Measurement is executed by two sensor heads alternately. This setting is used when one laser is mounted in a position where it will interfere with the other. Setting one unit to "Anti interfere 1" and the other to "Anti interfere 2" will result in measurement by alternating laser emission from the two units. The time for a single measurement will be double the set sampling period.

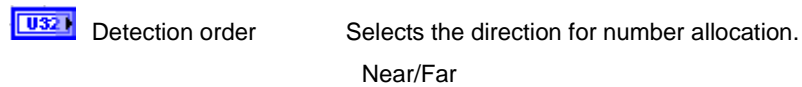
Detection order (Peak number order)

•Write

Sets whether to assign numbers from the near or far side of the sensor head when multiple reflected lights are received.

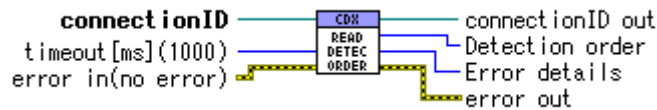


Input

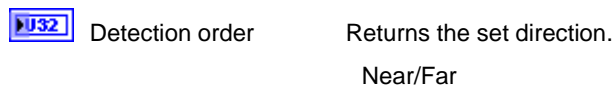


•Readout

Acquires whether to assign numbers from the near or far side of the sensor head when multiple reflected lights are received.



Output



Light distribution and Mask settings (Light-receiving waveform and mask settings)

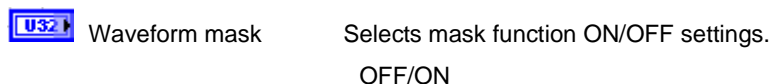
Waveform mask ON/OFF

•Write

Sets ON/OFF for the masking function for non-measurement within the measurement range.

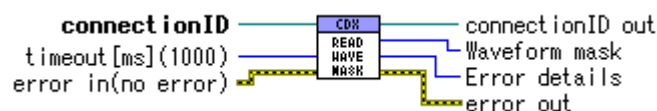


Input

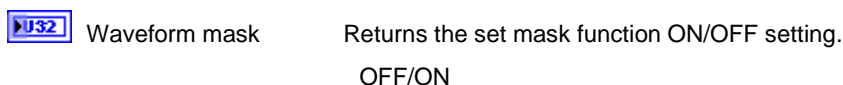


•Readout

Acquires the ON/OFF status of the masking function for non-measurement within the measurement range.



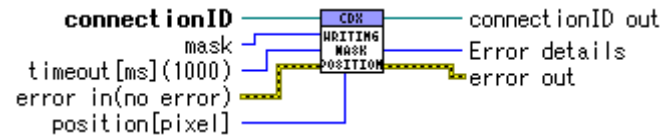
Output



Mask position

•Write

Sets the range of masking for non-measurement at four positions within the measurement range.



Input



mask

Selects the mask range.

start1/end1/start2/end2/start3/end3/start4/end4

Masks the range between “start” and “end.”



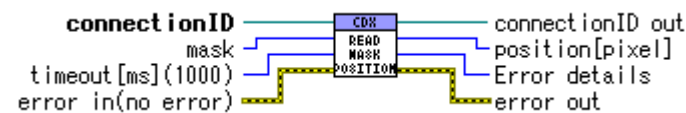
position[pixel]

Sets the mask position.

0 – 511 [pixel]

•Readout

Acquires the range of masking for non-measurement at four positions within the measurement range.



Input



mask

Selects the mask range.

start1/end1/start2/end2/start3/end3/start4/end4

Output



position[pixel]

Returns the set mask position.

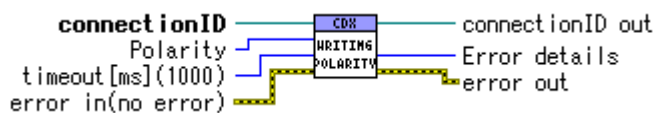
0 – 511 [pixel]

Input settings

Polarity (Input polarity)

•Write

Sets the external input terminal polarity.

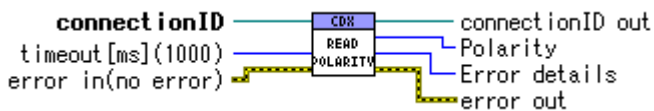


Input

U32 Polarity Selects the external input terminal polarity.
N.O./N.C.

•Readout

Acquires the external input terminal polarity.



Output

U32 Polarity Returns the external input terminal polarity.
N.O./N.C.

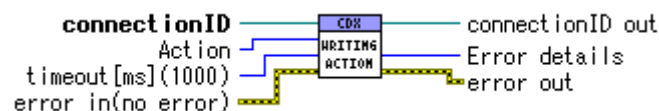
N.O.: ON during input.

N.C.: OFF during input.

Action (Input function selection)

•Write

Sets the external input terminal operation.



Input



Action

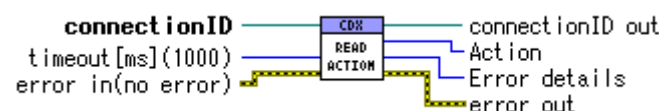
Selects the external input terminal operation.

None/Laser Off/Hold Reset

Storage Start/Offset

•Readout

Acquires the external input terminal operation.



Output



Action

Returns the set external input terminal operation.

None/Laser Off/Hold Reset

Storage Start/Offset

No setting: The external input terminal is not used (Input is ignored).

Laser OFF: Laser reflection during input is stopped.

Hold Reset: Used as hold/hold reset input when hold operation is used.

- When Peak/Bottom/Sample hold/Normal are set: Hold

- When auto-peak/Auto-bottom are set: Hold reset

Storage Start: Used as storage start input. Storage operation is performed while ON, terminated when the set data storage count is reached, and a file created. Switching input OFF during storage operation will abort storage operation and create a file of the data stored up to that point.

Offset: Used as offset or reset offset input.

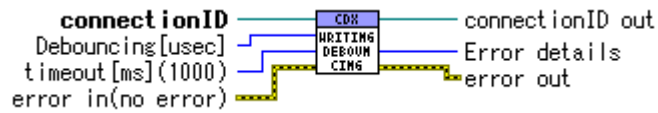
- Less than 1 second: Offset

- 1 second or longer: Reset offset

Debouncing (Input filter)

•Write

Sets the time delay between when external input is switched ON to when actual operation takes place.

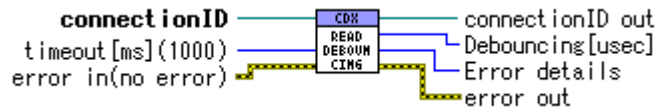


Input

U32 Debouncing[usec] Sets the time delay.
0 – 32767 [μsec]

•Readout

Acquires the time delay between when external input is switched ON to when actual operation takes place.



Output

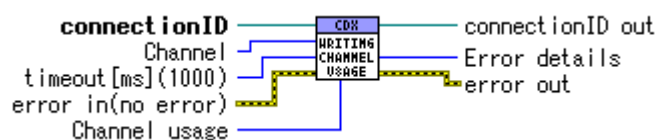
U32 Debouncing[usec] Returns the set time delay.
0 – 32767 [μsec]

Measurement/output settings

Channel use/non-use

•Write

Sets channel use/non-use.



Input



Channel

Selects channels.

Ch2/Ch3/Ch4

*This is the only command with which Ch1 is not used.



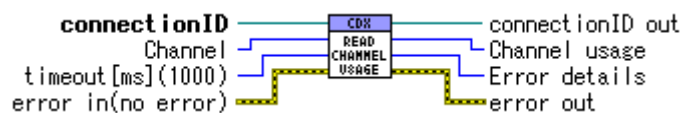
Channel usage

Selects use/non-use of channels.

Not used/Use

•Readout

Acquires channel use/non-use status.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



Channel usage

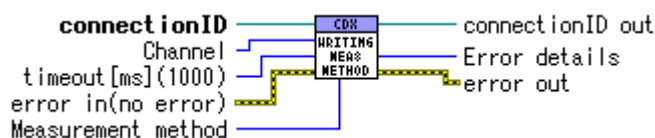
Returns the set channel use/non-use status.

Not used/Use

Measurement method

•Write

Sets content measured by each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



Measurement method

Selects content measured by each channel.

Displacement/Thickness/Velocity

•Readout

Acquires content measured by each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



Measurement method

Returns the set content measured by each channel.

Displacement/Thickness/Velocity

Displacement: Measures one specified point from the sensor. [Unit: mm]

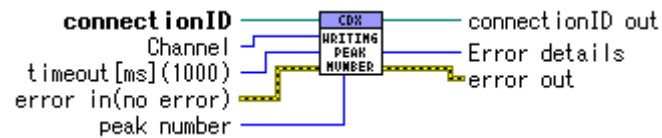
Thickness: Measures the distances of two points on targets reflected from multiple surfaces of items such as glass plates. [Unit: mm]

Velocity: Measures velocity [Unit: mm/s]

Peak number (Measurement peak number)

•Write

Sets the surface at which the target is measured (peak number) in each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



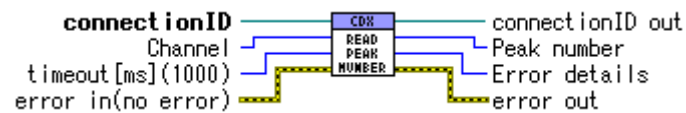
peak number

Selects peak numbers.

No.1 peak/...../ No.8 peak

•Read out

Acquires the surface at which the target is measured (peak number) in each channel.



Input



Channel

Inputs channels

Ch1/Ch2/Ch3/Ch4

Output



peak number

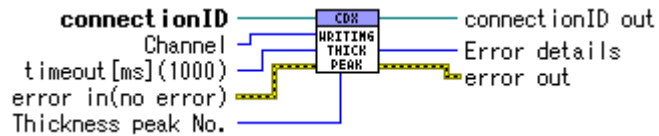
Returns the set peak number.

No.1 peak/...../ No.8 peak

Thickness peak No.

•Write

Sets the surface where the distance (thickness) from the surface selected by the measurement peak number is measured when “thickness” has been selected by the measurement method command.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



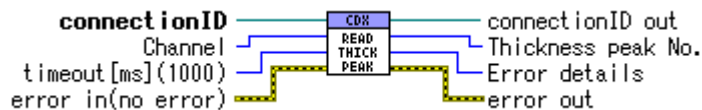
Thickness peak No.

Selects peak numbers.

No.1 peak/.../ No.8 peak

•Readout

Acquires the surface where the distance (thickness) from the surface selected by the measurement peak number is measured when “thickness” has been selected by the measurement method command.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



Thickness peak No.

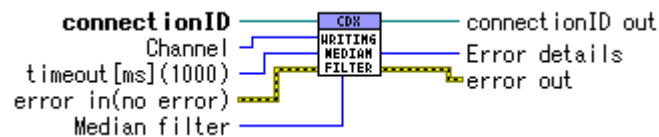
Returns the set peak number.

No.1 peak/.../ No.8 peak

Median filter

•Write

Sets the median filter value that cuts sudden changes in measured values to prevent variations.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



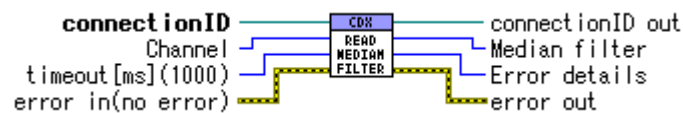
Median filter

Selects median filter values.

Not used/7/15/31

•Readout

Acquires the median filter value for each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



Median filter

Returns the set median filter value.

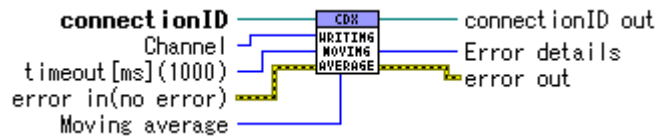
Not used/7/15/31

Moving average

•Write

Sets measured value averaging processing of values measured by each channel.

This processing is applied to the results of application of the median filter.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



Moving average

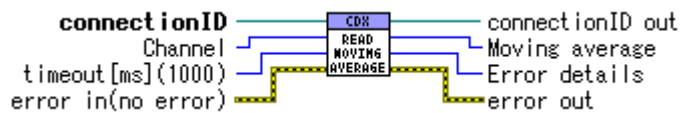
Selects the moving average count.

1/2/4/8/16/32/64/128/256/512/1024/2048/4096/8192/

16384/32768/65536

•Readout

Acquires averaged values from each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



Moving average

Returns the set moving average count.

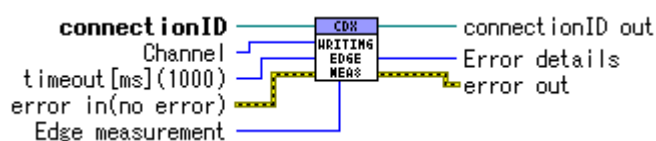
1/2/4/8/16/32/64/128/256/512/1024/2048/4096/8192/

16384/32768/65536

Edge measurement

•Write

Compares the current measured value of each channel with the before measured value of the specified sampling count. Sets the value of sampling count before comparison. Do not use the median filter or moving average count functions with this command.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



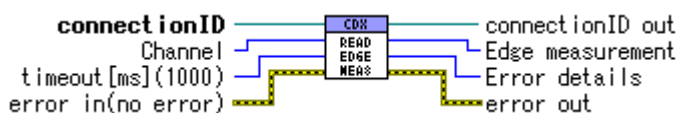
Edge measurement

Sets the value of sampling count before comparison.

0 – 100000 [Sampling count]

•Readout

Acquires the before value of comparison the specified sampling count for comparison.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



Edge measurement

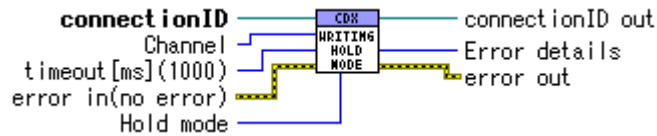
Returns the value for the specified sampling count to the before value.

0 – 100000 [Sampling count]

Hold mode

•Write

Sets the mode for extracting measured values from each channel specified as maximum and minimum within a certain period. The hold period is set by the hold operation command.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



Hold mode

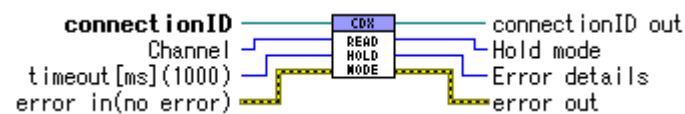
Selects modes.

OFF/Peak/Bottom/Sample Hold/Auto Peak/Auto

Bottom/Peak-to-peak/Normal

•Readout

Acquires the mode for extracting measured values from each channel specified as maximum and minimum within a certain period.



Input



Channel

Selects channels.

Output



Hold mode

Returns the set mode.

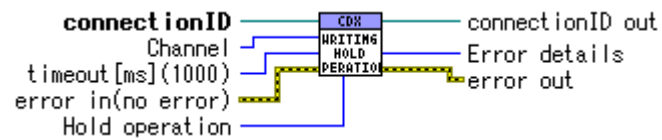
OFF/Peak/Bottom/Sample Hold/Auto Peak/Auto

Bottom/Peak-to-peak/Normal

Hold operation

•Write

Sets hold reset input in the hold period or in auto-peak or auto-bottom status for each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



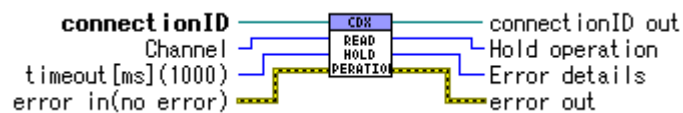
Hold operation

Selects processing to be executed.

None/Hold ON/Hold OFF/Hold reset

•Readout

Acquires the hold processing operation status of each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



Hold operation

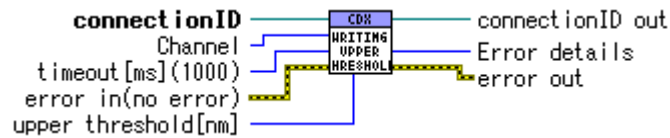
Returns the set processing operation.

None/Hold ON/Hold OFF/Hold reset

Measurement value upper threshold

•Write

Sets upper threshold values for output ON/OFF judgment by each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



upper threshold[nm]

Sets the upper threshold value.

-2000000000 – 2000000000 [nm]

•Readout

Acquires upper threshold values for output ON/OFF judgment by each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



upper threshold[nm]

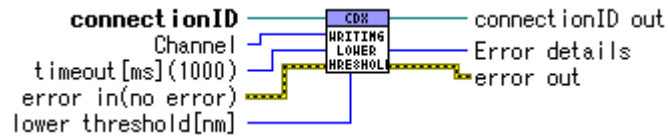
Returns the set upper threshold value.

-2000000000 – 2000000000 [nm]

Measurement value lower threshold

•Write

Sets lower threshold values for output ON/OFF judgment by each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



lower threshold[nm]

Sets the lower threshold value.

-2000000000 – 2000000000 [nm]

•Readout

Acquires lower threshold values for output ON/OFF judgment by each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



lower threshold[nm]

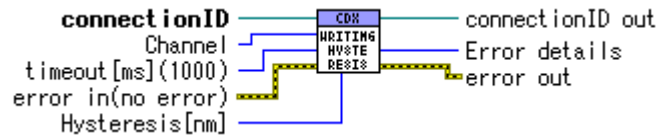
Returns the set lower threshold value.

-2000000000 – 2000000000 [nm]



Hysteresis

•Write

Sets the hysteresis value that gives latitude to the output ON-to-OFF value after the threshold value has been exceeded.

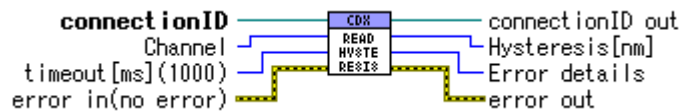


Input

	Channel	Selects channels. Ch1/Ch2/Ch3/Ch4
	Hysteresis[nm]	Sets the hysteresis value. -2000000000 – 2000000000 [nm]

•Readout


Acquires the hysteresis value for each channel.



Input

	Channel	Selects channels. Ch1/Ch2/Ch3/Ch4
---	---------	--------------------------------------

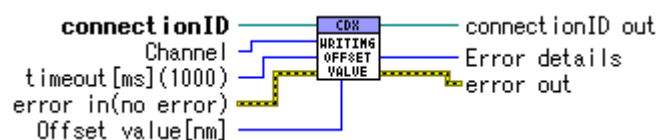
Output

	Hysteresis[nm]	Returns the set hysteresis value. -2000000000 – 2000000000 [nm]
---	----------------	--

Offset value

•Write

Corrects measured values in each channel. Sets the required value to be added to the value multiplied by the span value (multiplication) command.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



Offset value[nm]

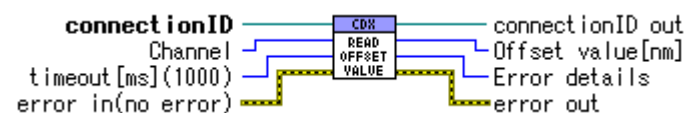
Sets the offset value.

-2000000000 – 2000000000 [nm]

Measured value = Span value (multiplication) x {Actual measured value + offset value} +
Offset value (to be added)

•Readout

Acquires the offset value for each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



Offset value[nm]

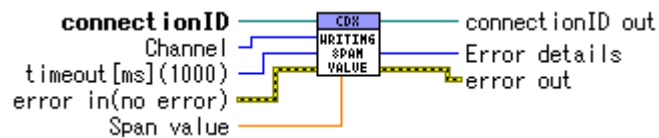
Returns the set offset value.

-2000000000 – 2000000000 [nm]

Span value (multiplication)

•Write

Corrects the measured value of each channel. Sets the required value to multiply the measured value.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



Span value

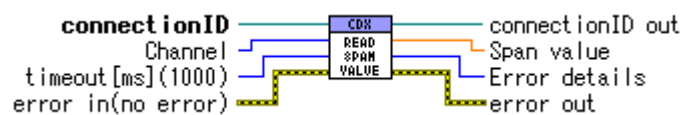
Sets the span value.

-2.000000 - 2.000000

Measured value = Span value (multiplication) x {Actual measured value + Offset value} +
Offset value (to be added)

•Readout

Acquires the value from each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



Span value

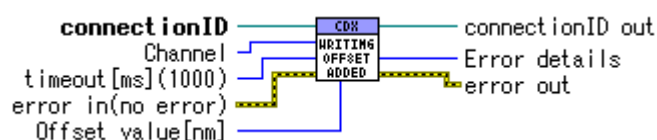
Returns the set span value.

-2.000000 - 2.000000

Offset value (to be added)

•Write

Corrects the measured value of each channel. Set the required value to be added to the value multiplied by the span value (multiplication) command.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



Offset value[nm]

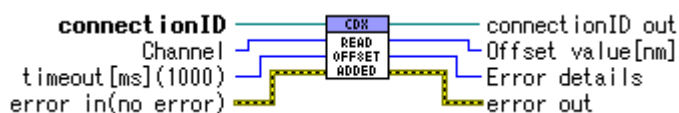
Sets the offset value.

-2000000000 – 2000000000 [nm]

Measured value = Span value (multiplication) x {Actual measured value + Offset value} +
Offset value (to be added)

•Readout

Acquires the offset value (to be added) of each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



Offset value[nm]

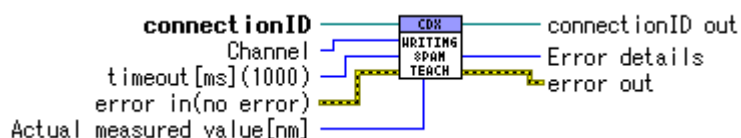
Returns the set offset value.

-2000000000 – 2000000000 [nm]



Span teaching

•Write

Sets the span value of each channel based on the actual measured value. Teaching is performed using actual work the dimensions of which are known to find the span value. The span value is set automatically when the actual dimensions are input, and span teaching selected by the executing teaching command.

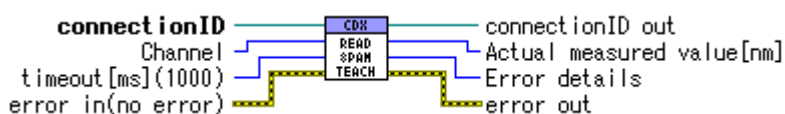


Input

	Channel	Selects channels. Ch1/Ch2/Ch3/Ch4
	Actual measured value[nm]	Sets the actual measured value. 0 – 2000000000 [nm]

•Readout


Acquired the span teach value of each channel.



Input

	Channel	Selects channels. Ch1/Ch2/Ch3/Ch4
---	---------	--------------------------------------

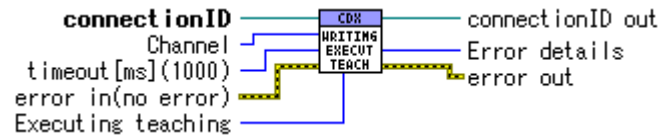
Output

	Actual measured value[nm]	Returns the set span teach value. 0 – 2000000000 [nm]
---	---------------------------	--



Executing teaching

•Write

Performs offsetting and span teaching for each channel.

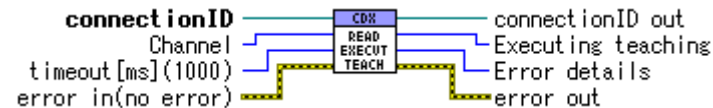


入力

	Channel	Selects channels. Ch1/Ch2/Ch3/Ch4
	Executing teaching	Selects teach. None/Execute offset (Offset executed) Clear offset (Offset cleared) Span teaching (Span teach)

•Readout


Acquires the teach operation status of each channel.



Input

	Channel	Selects channels. Ch1/Ch2/Ch3/Ch4
---	---------	--------------------------------------

Output

	Executing teaching	Returns the set teaching operation status. None/Execute offset (Offset executed) Clear offset (Offset cleared) Span teaching
---	--------------------	---

Offset performed: A value that ensures that the measured value is 0 is automatically set in the offset value.

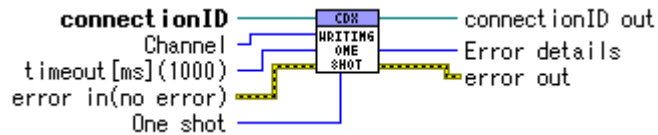
Offset cleared: The offset value is set to 0.

Span teaching: A span value is automatically set to ensure that the measured value is the value set by the span teaching command.

One shot

•Write

Sets one-shot to switch output OFF after it has been switched ON only for the time set by the OFF delay time command for each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



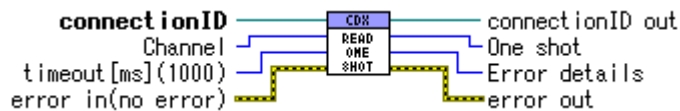
One shot

Selects the one-shot setting.

OFF/ON

•Readout

Acquires the one-shot setting of each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



One shot

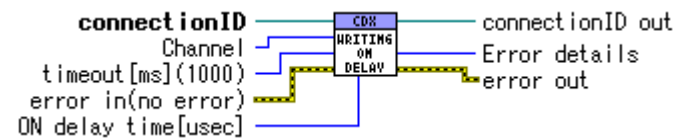
Returns the set one-shot setting.

OFF/ON

ON delay time

•Write

Sets the ON-delay time until output is actually switched ON after the measured value exceeds the threshold value for each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



ON delay time[usec]

Sets the delay time.

0 – 4000000 [usec]

•Readout

Acquires the ON-delay time of each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



ON delay time[usec]

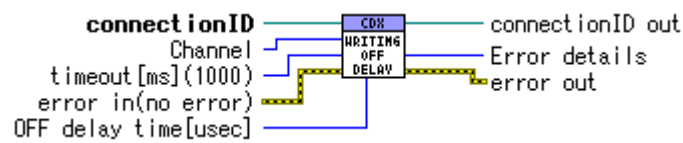
Returns the set ON-delay time.

0 – 4000000 [usec]

OFF delay time

•Write

Sets delay for the time until output is switched OFF when the measured value falls below the threshold value from the output-ON status for each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



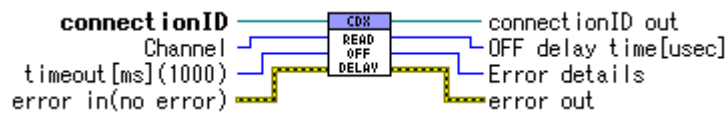
OFF delay time[usec]

Sets the delay time.

0 – 4000000 [μsec]

•Readout

Acquires the OFF-delay time of each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



OFF delay time[usec]

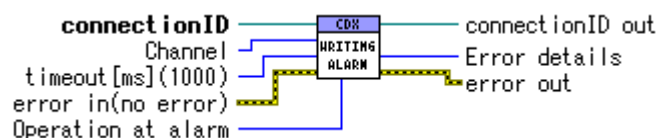
Returns the set OFF-delay time.

0 – 4000000 [μsec]



Alarm

•Write

Sets the actual measured value display method when measurement becomes impossible in each channel.



Input

	Channel	Selects channels. Ch1/Ch2/Ch3/Ch4
	Operation at alarm	Selects operation when an alarm is generated. Clamp/Hold/Delay clamp

•Readout


Acquires the measured value display method when measurement becomes impossible in each channel.



Input

	Channel	Selects channels. Ch1/Ch2/Ch3/Ch4
---	---------	--------------------------------------

Output

	Operation at alarm	Returns the set operation when an alarm is generated. Clamp/Hold/Delay clamp
---	--------------------	---

Clamp: Displays the specified value.

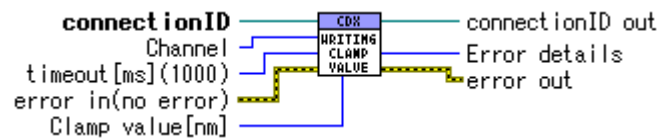
Hold: Holds the value immediately before an alarm is generated.

Delay clamp: Operates “clamp” after “hold” has been operated for the specified time.

Clamp value at alarm detection

•Write

Sets the value displayed when an alarm is generated when “clamp” or “delay clamp” is set by the alarm command for each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



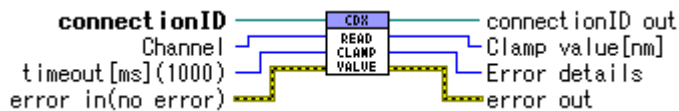
Clamp value[nm]

Sets the value displayed when an alarm is generated.

-2000000000 – 2000000000 [nm]

•Readout

Acquires the value displayed when an alarm is generated for each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



Clamp value[nm]

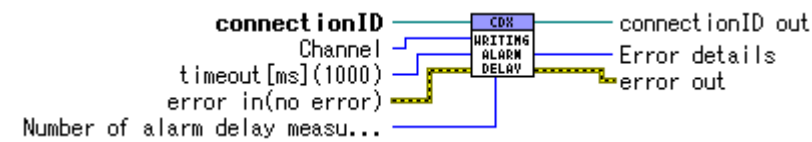
Returns the set value to be displayed when an alarm is generated.

-2000000000 – 2000000000 [nm]

Number of alarm delay measurements

•Write

Sets the period of operation put into hold status as a sampling count when “delay clamp” is set by the alarm command for each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



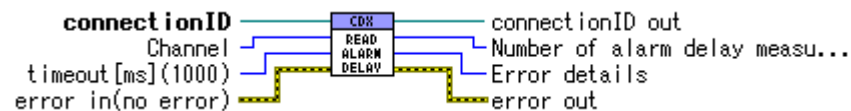
Number of alarm
delay measurements

Sets the hold period.

0 – 4095 [Sampling count]

•Readout

Acquires the period during which operation is put into hold status for each channel as sampling count.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



Number of alarm
delay measurements

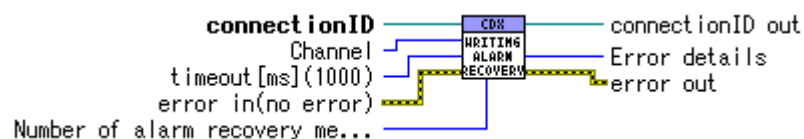
Returns the set hold period.

0 – 4095 [Sampling count]

Alarm recovery

•Write

Sets the period from alarm status until restoration of the measurement-possible status as a sampling count when “delay clamp” is set by the alarm command for each channel.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4



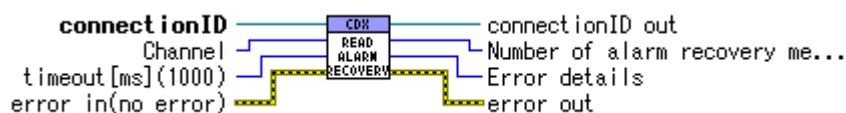
Number of alarm
recovery measurements

Sets the period until restoration.

0 – 4095 [Sampling count]

•Readout

Acquires the period from alarm status until restoration of the measurement-possible status as a sampling count.



Input



Channel

Selects channels.

Ch1/Ch2/Ch3/Ch4

Output



Number of alarm
recovery measurements

Returns the set period.

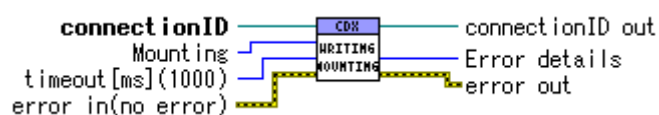
0 – 4095 [Sampling count]

Device setting

Mounting

•Write

Sets and acquires the sensor head mounting method. Selectable only for sensor heads for which the mounting method can be selected.



Input



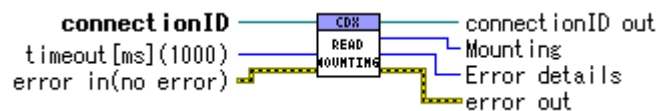
Mounting

Selects the sensor head mounting method.

Diffuse (Diffuse reflection device)/Specular (Specular reflection device)

•Readout

Acquires the sensor head mounting method.



Output



Mounting

Returns the set mounting method.

Diffuse (Diffuse reflection device)/Specular (Specular reflection device)

Diffuse reflection: This the normally used type.

Specular reflection: Mounted at a specular reflection angle for measurement. This type is used to measure targets such as mirror surfaces or glass that do not produce diffuse reflection.

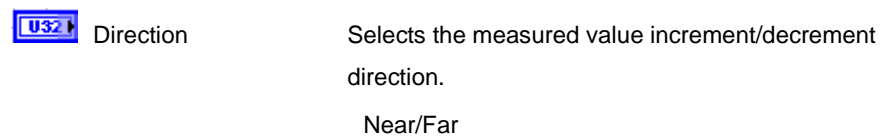
Direction

•Write

Sets the measured value increment/decrement direction taking the measurement center as 0.

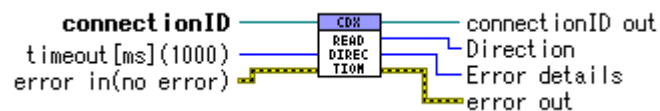


Input

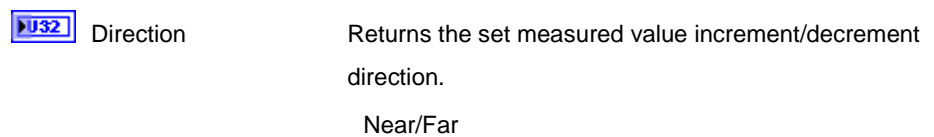


•Readout

Acquires the measured value increment/decrement direction taking the measurement center as 0.



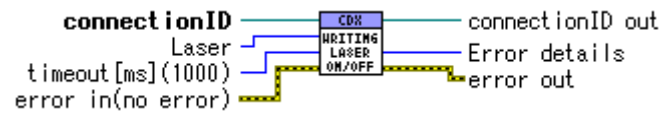
Output



Laser ONOFF

•Write

Sets laser emission ON/OFF.



Input

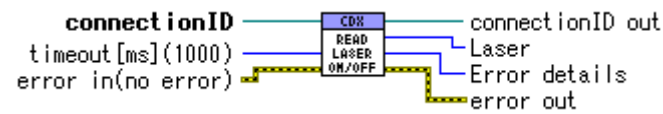


Laser

Selects laser emission.
ON/OFF

•Readout

Acquires the laser emission ON/OFF status.



Output



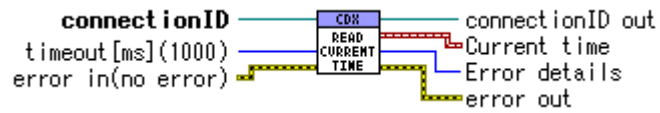
Laser

Returns the set laser emission ON/OFF status.
ON/OFF

Current time

- Readout

Acquires the current time in the sensor.



Output



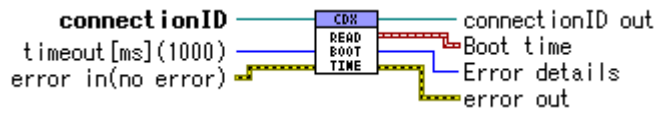
Current time

Returns the set current time.

Boot time

- Readout

Acquires the startup time in the sensor.



Output



Boot time

Returns the set startup time.

Sensor time (Time setting)

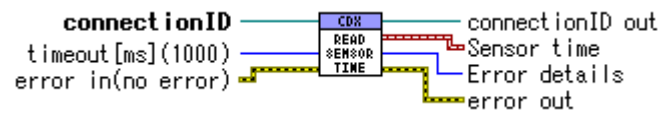
•Write

Sets the PC time as the current time in the sensor. The current time in the sensor is set when the changing the time setting command is performed after this command.



•Readout

Acquires the time reflected in the current time command.



Output



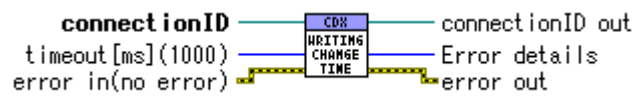
Sensor time

Returns the set time.

Changing the time setting

•Write

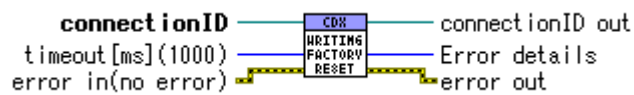
Sets the current time in the sensor. The current time in the sensor is set when this command is executed after the sensor time command.



Factory Reset

•Write

Returns all settings except the Ethernet communication setting to the factory setting status.

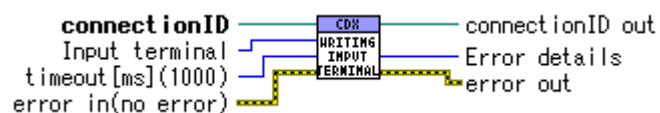


Communication

Input terminal setting

•Write

Sets input terminal operation matched to the connection target.



Input



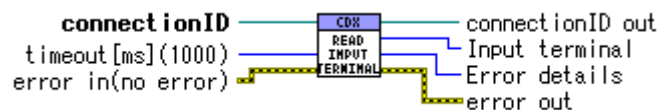
Input terminal

Selects the input terminal.

External Input (External input terminal)/CDA

•Readout

Acquires the input terminal connection target.



Output



Input terminal

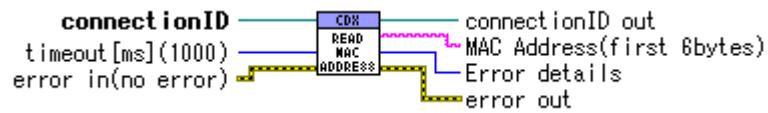
Returns the set input terminal.

External Input (External input terminal)/CDA

MAC Address

- Readout

Acquires the MAC address registered in the main body.



Output



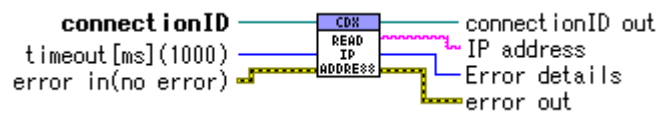
MAC Address
(first 6bytes)

Returns the set MAC address.

IP address

- Readout

Acquires the IP address of the main body.



Output



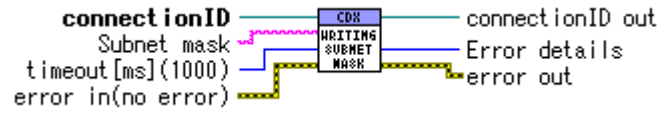
IP Address

Returns the set IP address.

Subnet mask

•Write

Sets the subnet mask of the main body.



Input

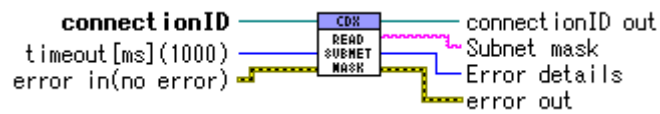


Subnet mask

Sets the subnet mask.

•Readout

Acquires the subnet mask of the main body.



Output



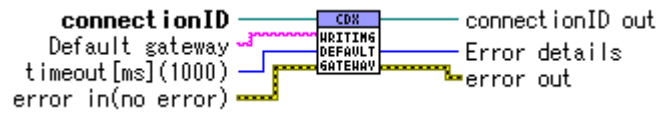
Subnet mask

Returns the set subnet mask.

Default gateway

•Write

Sets the default gateway of the main body.

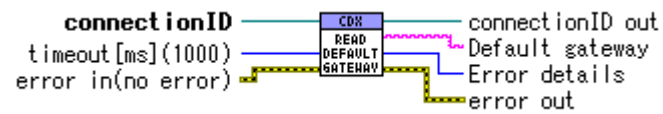


Input


 Default gateway Sets the default gateway.

•Readout

Acquires the default gateway of the main body.



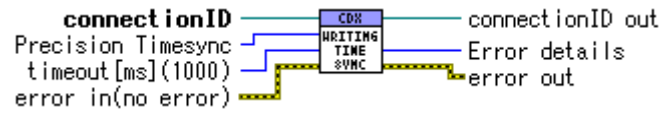
Output

 Default gateway Returns the set default gateway.


Precision Timesync

•Write

Sets high-precision synchronization of clocks between sensors using a single unit as the time server when multiple CDX series units are used.

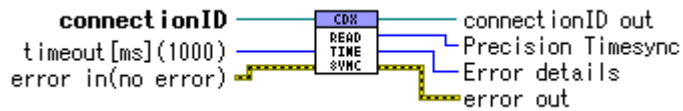


Input


 Precision Timesync Selects the synchronization setting.
OFF/Slave/Master

•Readout

Acquires the high-precision synchronization status of clocks between sensors using a single unit as the time server when multiple CDX series units are used.



Output

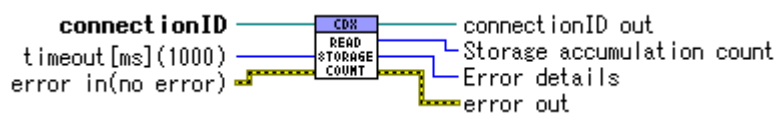
 Precision Timesync Returns the set synchronization setting.
OFF/Slave/Master

Storage setting

Storage accumulation count

- Readout

Acquires the number of data stored.



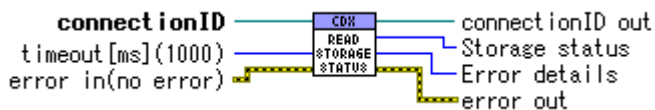
Output

U32 Storage accumulation count Returns the number of data stored.

Storage status

- Readout

Acquires the storage function operation status.



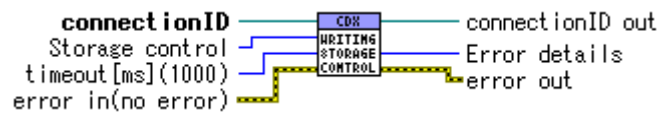
Output

U32 Storage status Returns the operation status.
Stopped/Waiting/Trigger standby/Storage operation in progress/Storage operation complete

Storage control

•Write

Sets storage operation.



Input



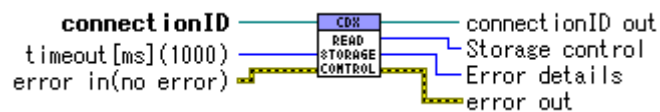
Storage control

Selects storage operation.

Standby/Start

•Readout

Acquires the storage operation status.



Output



Storage control

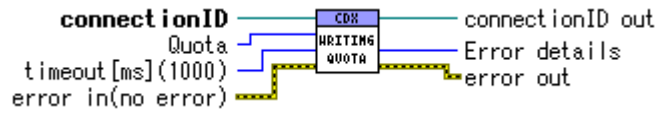
Returns the storage operation status.

Standby/Start

Quota

•Write

Sets the number of data stored by a single storage operation.



Input



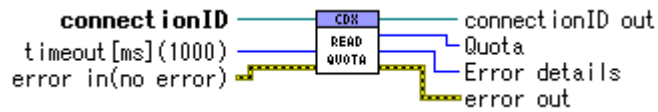
Quota

Sets the stored data count.

1 - 100000

•Readout

Acquires the number of data stored by a single storage operation



Output



Quota

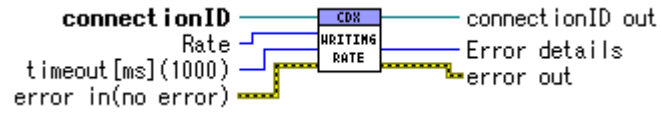
Returns the set stored data count.

1 - 100000

Rate

•Write

Sets the interval at which measured data is stored.



Input



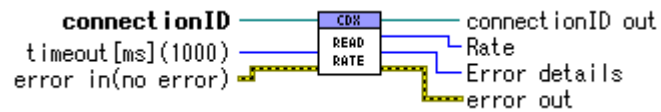
Rate

Sets the storage interval.

1 - 1000000

•Readout

Acquires the interval at which measured data is stored.



Output



Rate

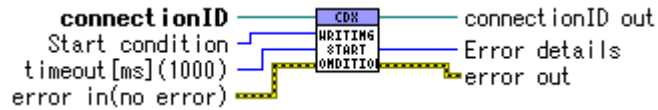
Returns the set storage interval.

1 - 1000000

Start condition

•Write

Sets trigger conditions for the start of the storage.



Input



Storage control

Selects the start trigger.

Immediate (None)/Alarm Off edge/Alarm On edge/
Threshold Up edge/Threshold Down edge/Threshold
Both edge

•Readout

Acquires trigger conditions for the start of the storage.



Output



Storage control

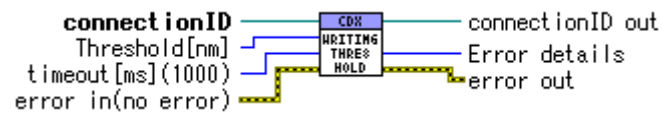
Returns the set start trigger status.

Immediate (None)/Alarm Off edge/Alarm On edge/
Threshold Up edge/Threshold Down edge/Threshold
Both edge

Threshold

•Write

Sets the threshold value used when a threshold value is selected by the start condition command.

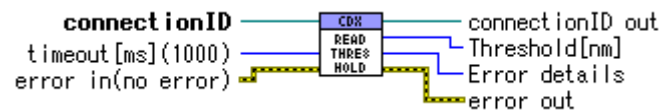


Input

I32 Threshold[nm] Sets the threshold value.
-2000000000 – 2000000000 [nm]

•Readout

Acquires the threshold value used when a threshold value is selected by the start condition command.



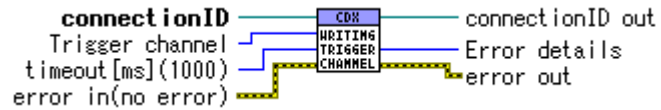
Output

I32 Threshold[nm] Returns the set threshold value.
-2000000000 – 2000000000 [nm]


Trigger channel

•Write

Sets and acquires the start-trigger target channel for the start of storage.

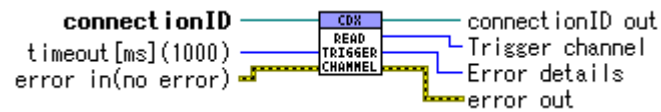


Input


 Trigger channel Selects the trigger-target channel.
Ch1/Ch2/Ch3/Ch4

•Readout

Acquires the start-trigger target channel for the start of storage.



Output

 Trigger channel Returns the set trigger-target channel.
Ch1/Ch2/Ch3/Ch4

Start position

•Write

Sets the time by which the start of storage is adjusted after start conditions have been satisfied as a sampling count.

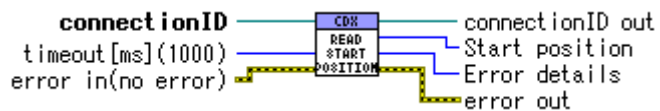


Input

I32 Start position Sets the adjustment count.
-50000 – 50000 [Sampling count]

•Readout

Acquires the time by which the start of storage is adjusted after start conditions have been satisfied as a sampling count.



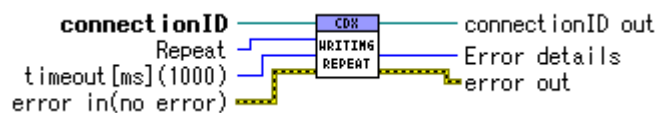
Output

I32 Start position Returns the set adjustment count.
-50000 – 50000 [Sampling count]

Repeat

•Write

Sets operation after storage operation has been performed.

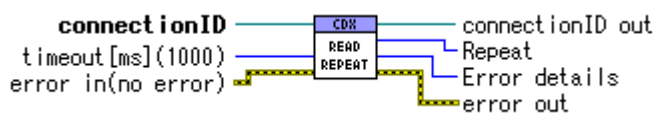


Input

U32 Repeat Selects operation after execution.
OFF/ON

•Readout

Acquires the operation status after storage operation has been performed.



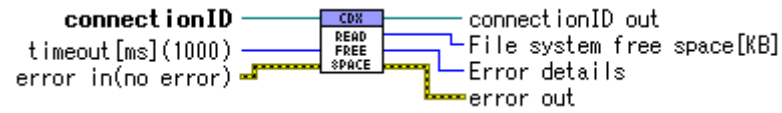
Output

U32 Repeat Returns the set operation after performance.
OFF/ON

File system free space

• Readout

Acquires the free space in the file system.



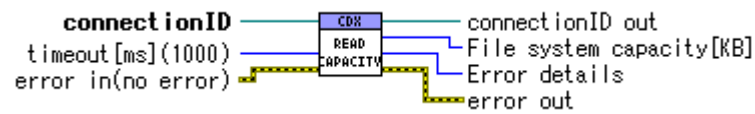
Output

U32 File system free space [KB] Returns the free space in the file system.

File system capacity

• Readout

Acquires the total space in the file system.



Output

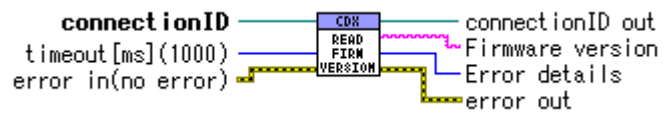
U32 File system capacity[KB] Returns the total space in the file system.

Information

Firmware version

- Readout

Acquires the main body firmware version.



Output



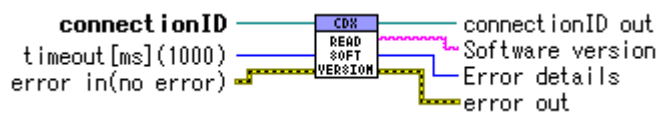
Firmware version

Returns the main body firmware version.

Software version

- Readout

Acquires the main body software version.



Output



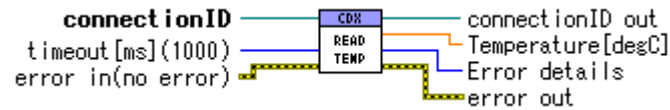
Software version

Returns the main body software version.

Temperature

•Readout

Acquires the temperature in the sensor head.



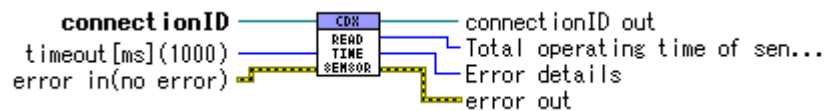
Output

DBL Temperature[degC] Returns the temperature in the sensor head.

Total operating time of sensor

•Readout

Acquires the total operating time with the sensor power supply on.



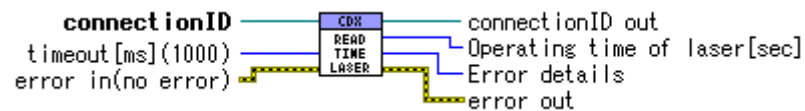
Output

U32 Total operating time of sensor[sec] Returns the total operating time.

Operating time of laser

•Readout

Acquires the total sensor laser emission operating time.



Output

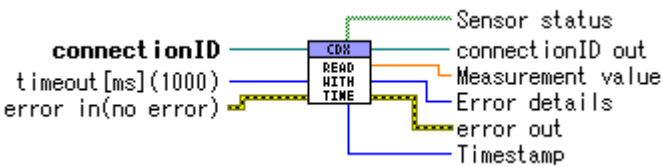
U32 Operating time of laser[sec] Returns the total operating time.

Other




Acquiring measured values with time data

• Readout

Acquires measured values with time data.



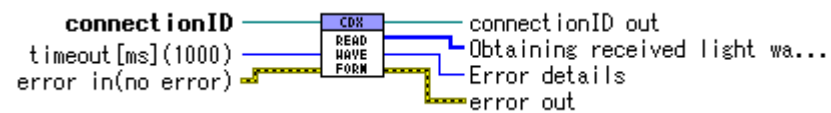
Output

	Measurement value	Returns measured values with the following units. Displacement measurement [mm] Thickness measurement [mm] Velocity measurement [mm/s]
	Timestamp	Returns the time stamp. 0 – 999999999 [nsec]
	Sensor status	Returns the sensor output status.

Obtaining received light waveforms

- Readout

Acquires the received-light waveform. Data is acquired continually as received light volume at each point in order from the near side of the sensor head.



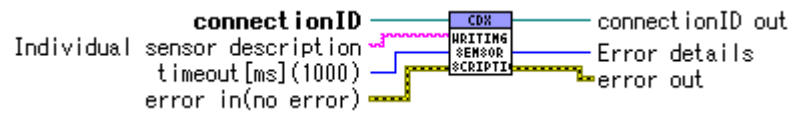
Output

U16 Obtaining received light waveforms Returns the received-light volume.


Individual sensor description

•Write

Writes descriptions of individual sensors. The maximum number of characters in a description is 30 bytes.

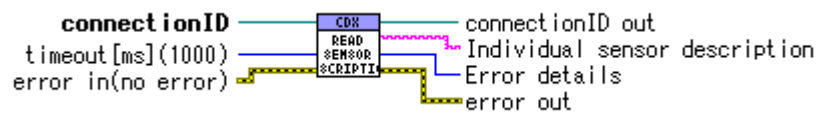


Input


 Individual sensor description
Inputs individual descriptions.

•Readout

Acquires individual sensor descriptions.



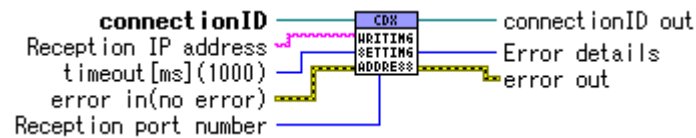
Output

 Individual sensor description
Returns set individual descriptions.


Setting the reception port and IP address


•Write

Sets the continuous transmission reception IP address and port number.



Input

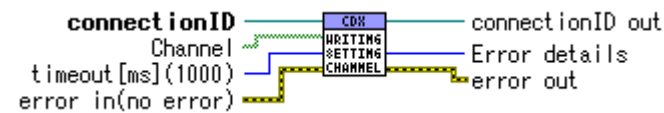
 Reception IP address Sets the IP address of the continuous transmission destination (PC).

 Reception port number Sets the reception port number of the continuous transmission destination (PC).


Setting the transmission channels

•Write

Sets the continuous transmission channel.



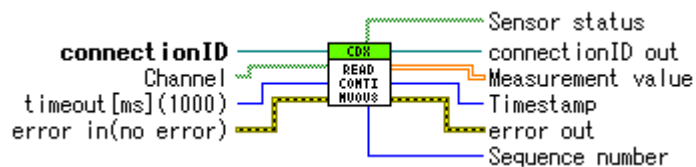
Input

 Channel Sets the continuous transmission channel.

Continuous transmission data format

• Readout

Acquires continuous transmission data. Transmits 1ms-worth of data together.



Input

[TF] Channel Sets the continuous transmission channel.

Output

[5GL] Measurement value Returns measured values with the units below.
 Displacement measurement [mm]
 Thickness measurement [mm]
 Velocity measurement [mm/s]

[J32] Timestamp Returns the time stamp.
 0 – 999999999 [nsec]

[J32] Sequence number Returns the transmitted data order.

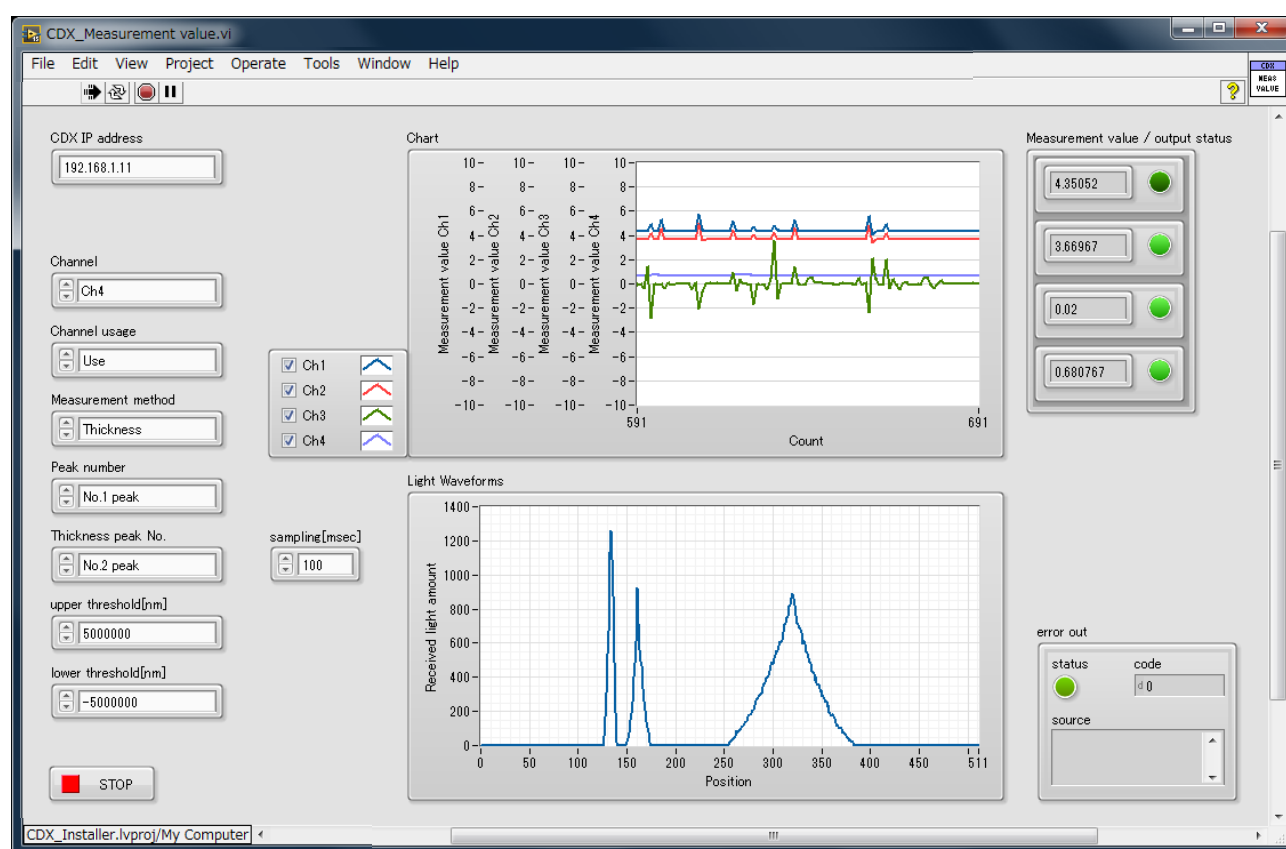
[TF] Sensor status Returns the sensor output status.

32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	◀ Bit
(Not used)	ON when the laser is emitted	ON when storage file area is full	ON when precision timesync is in operation	On for alarm status	(Not used)	(Not used)	Input terminal status	(Not used)	(Not used)	(Not used)	(Not used)	Ch4 control input/output	Ch3 control input/output	Ch2 control input/output	Ch1 control input/output	(Not used)	(Not used)	(Not used)	(Not used)	(Not used)	Ch1 HI output	Ch1 GO output	Ch1 LO output	(Not used)	(Not used)	Ch1 hold ON	Ch1 zero set ON	(Not used)	ON when measurement for Ch1 is not possible	Ch1 control input/output status (ON/OFF)	(Usually ON)	

Samples

Measurement value

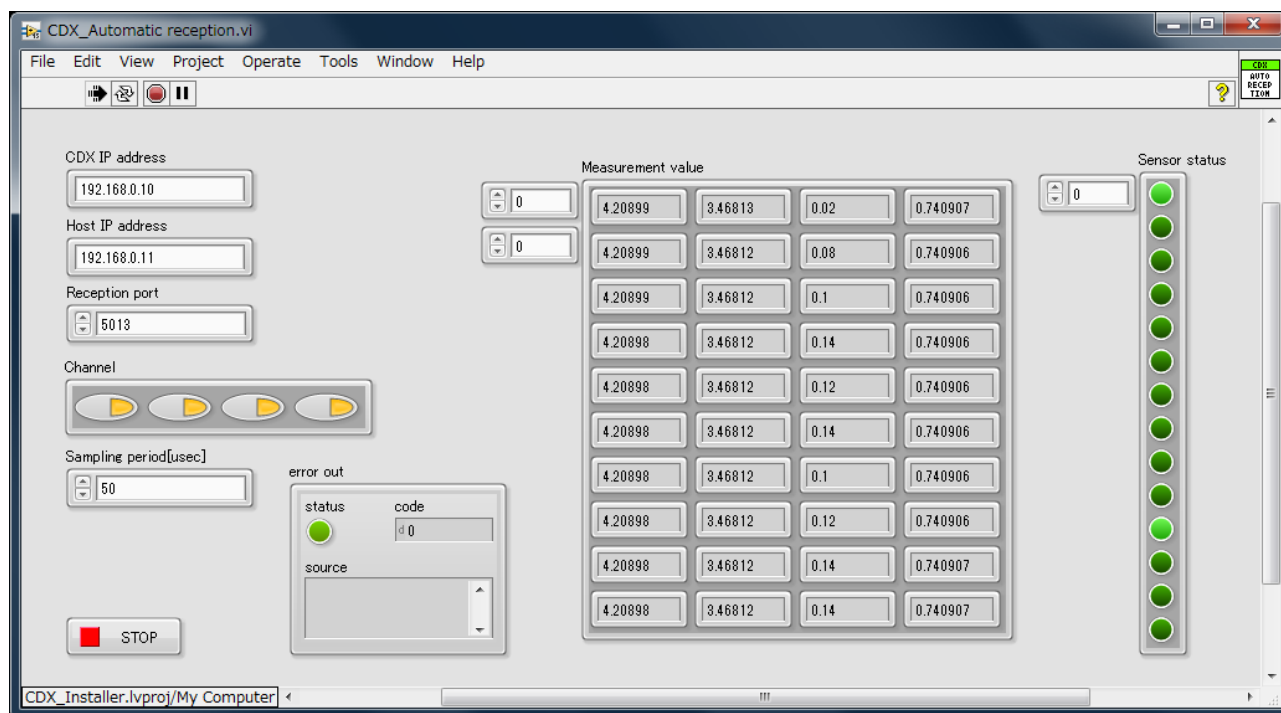
Sets measurement methods for each channel and acquires elements from measurement such as measured values, output statuses and received light waveforms.



Item	Description
CDX IP address	Sets the CDX IP address.
Channel	Sets channels for which conditions are to be set. When channels are changed, current conditions will be reflected in each setting space.
Channel usage	Sets use/non-use of channels.
Measurement method	Sets details to be measured. Displacement/Thickness/Velocity
Peak number	Sets the surface (Peak number) of the target to be measured for each channel.
Thickness peak no.	If "Thickness" is selected as the measurement method, set the surface where the distance (thickness) from the surface specified by peak number is to be measured.
upper threshold[nm]	Sets the upper threshold for output ON/OFF judgment.
lower threshold[nm]	Sets the lower threshold for output ON/OFF judgment.
Sampling[msec]	Sets the interval for acquisition of measured values.
Chart	Displays measured value charts for each channel.
Measurement value / output status	Displayed measured values and output status of each channel. Displacement measurement [mm] Thickness measurement [mm] Velocity measurement [mm/s]
Light Waveforms	Displays received light waveforms.

Automatic reception

All sampling measurement values are acquired by measurement and automatic transmission at the set sampling cycle.



Item	Description
CDX IP address	Sets the CDX IP address.
Host IP address	Sets the PC IP address.
Reception port	Sets the PC receiving port.
Channel	Sets the measuring channel.
Sampling period[usec]	Sets the sampling cycle.
Measurement Value	Displays measured values.
Sensor status	Displays the sensor status.

*The volume of data sent by “Channel” and “Sampling period [usec]” settings may be sizeable and errors may occur. In such cases, the “Channel” and “Sampling period [usec]” settings should be changed to reduce the volume of data.