USB I/O Unit X Series
500kSPS 16-bit Analog I/O Unit for USB

AIO-163202FX-USB

* Specifications, color and design of the products are subject to change without notice.

This product is a USB2.0-compliant analog I/O unit that extends the analog I/O function of USB port of PCs. This product features high-precision 16bit analog inputs (32channels), high-precision 16bit analog outputs (2channels), digital I/O (LVTTL level each 8channels), and a counter (32bit binary, LVTTL level 2channels) function.
This product includes an event controller for integrated management of control signals by hardware and buffer memory (128k data). Together, these features provide all you need to build a high-performance PC-based measurement and control system.
As there is compatible with PCI bus-compatible board ADA16-32/2(PCI)F and PCI Express bus-compatible board AIO-163202F-PE in terms of connector shape and pin assignments, it is easy to migrate from the existing system.
Windows/Linux device driver is supported with this product.

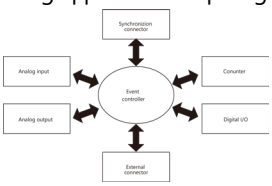
* The contents in this document are subject to change without notice.
* Visit the CONTEC website to check the latest details in the document.
* The information in the data sheets is as of December, 2025.

Features

Multi-function
The unit contains analog inputs (16bit, 32channels), analog outputs (16bit, 2channels), digital inputs (LVTTL level 8channels), digital outputs (LVTTL level 8channels), and counters (32bit binary, LVTTL level 2channels). Combining all these features on one unit allows complex systems to be implemented even on PCs with USB port only.

Compatible to USB1.1/USB2.0
Compatible to USB1.1/USB2.0 and capable to achieve high speed transfer at High Speed (480 Mbps).

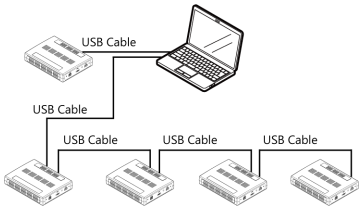
Built-in event controller for advanced synchronization control
The built-in event controller enables integrated management of the triggers and statuses of each signal input and output, enabling hardware-level synchronization control of signal inputs and outputs.
As a result, the product is ideal for factory automation and mixed-signal testing applications requiring low-latency, real-time responsiveness.



Scenario 1: Analog input and output synchronized with an external clock signal.

Scenario 2: Analog input performed whenever the counter value reaches the set value.

USB HUB function
This product has the USB HUB function. Max. 4 products can be used in 1 USB port of PC. *1
When you use 4 or more products, you can do by connecting products to the another USB port of PC side.
Also, you can connect the CONTEC's USB device other than products to the USB port of products. *2*3



Buffer memory for 128k of data available for background processing
The analog inputs and outputs each have their own buffer memory (128k data) which can be used. The buffer memory can be used as FIFO or RING form.
You can also perform analog input and output in the background, independent of software and the current status of the PC.

Software-based adjustment function
Adjustment of analog input/output can be all performed by software. Apart from the adjustment information prepared before shipment, additional adjustment information can be stored according to the use environment.

Filter function for easy connection of external signals
The digital input signals, counter input signals, and the external control signals for analog I/O incorporate a digital filter to prevent problems such as chattering.

Compatible with PCI / PCI Express bus board in it's design. Common connector shape and pin assignment with PCI / PCI Express bus board.
This product has the common connector shape and pin assignment with PCI bus board ADA16-32/2(PCI)F, PCI Express bus board AIO-163202F-PE so you can use the common cables and accessories, it is easy to migrate from the existing system *4.

⚠CAUTION
This product has neither the bus master transfer function nor a synchronous control connectors that exist in the PCI bus-compatible board ADA16-32/2(PCI)F and the PCI Express bus-compatible board AIO-163202F-PE. In the system that uses the bus master transfer function and the synchronous control connector, it is not likely to be able to shift.

Windows/Linux support device driver
Using the device driver API-TOOL makes it possible to create applications of Windows/Linux. In addition, a diagnostic program by which the operations of hardware can be checked is provided.

*1 This product cannot be stacked up for installation.
*2 Do not connect the device other than that of CONTEC's USB to the USB port included on the product. Otherwise, this may cause a failure or malfunction.
*3 When connecting multiple units with USB HUB function and set up them, do one at a time and complete setup for the previous unit before starting to do the next unit.
*4 There are some differences of the specifications between this product and AIO-163202F-PE, ADA16-32/2(PCI)F. For more details on this, refer to **"Differences between this product and our earlier models."**

Specifications

Function specification

Item	Specifications
Analog input	
Isolated specification	Non-isolated
Input type	Single-Ended Input or Differential Input
Number of input channels	32channels (Single-Ended Input) 16channels (Differential Input)
Input range	Bipolar ±10V, ±5V, ±2.5V or Unipolar 0 - +10V, 0 - +5V, 0 - +2.5V
Absolute max. input voltage	±15V
Input impedance	1MΩ or more
Resolution	16bit
Non-Linearity error *1*2	±5LSB
Conversion speed	2µsec/ch (Max.) *3 [500kSPS] *4
Buffer memory	128k data FIFO or 128k data RING
Conversion start trigger	Software, conversion data compare, external trigger, and event controller output etc.,
Conversion stop trigger	Settings include data save complete, conversion data compare, external trigger, event controller output, and software etc.,
External start signal	LVTTL level (Rising or falling edge can be selected by software)
External stop signal	LVTTL level (Rising or falling edge can be selected by software)
External clock signal	LVTTL level (Rising or falling edge can be selected by software)
External status output signal	LVTTL level : 2 Sampling clock output
Analog output	
Isolated specification	Non-isolated
Number of output channels	2channels
Output range	Bipolar ±10V, ±5V, ±2.5V, ±1.25V or Unipolar 0 - +10V, 0 - +5V, 0 - +2.5V
Absolute max. output current	±5mA
Output impedance	1Ω or less
Resolution	16bit
Non-Linearity error *1	±3LSB
Conversion speed	10µsec (Max.) [100kSPS] *4
Buffer memory	128k data FIFO or 128k data RING
Conversion start trigger	Software, external trigger, and event controller output etc.,
Conversion stop trigger	Settings include data save complete, external trigger, event controller output, and software etc.,
External start signal	LVTTL level (Rising or falling edge can be selected by software)
External stop signal	LVTTL level (Rising or falling edge can be selected by software)
External clock signal	LVTTL level (Rising or falling edge can be selected by software)
External status output signal	LVTTL level : 2 Sampling clock output
Digital I/O	
Number of input channels	Non-isolated input 8channels (LVTTL level positive logic)
Number of output channels	Non-isolated output 8channels (LVTTL level positive logic)
Counter	
Number of channels	2channels
Counting system	Up count
Max. count	FFFFFFFFh (Binary data, 32bit)
Number of external inputs	LVTTL level : 2 (Gate/Up)/ch, Gate (High level), Up (Rising edge)
Number of external outputs	LVTTL level : 1/ch, Count match output (positive logic, pulse output)
Frequency response	10MHz (Max.)
USB	
Bus specification	USB Specification 2.0/1.1 standard
USB transfer rate	12Mbps (Full-speed), 480Mbps (High-speed) *5
Power supply	Self power *6
Attached AC adapter (POA200-20-2)	90 - 264VAC 5.0VDC±5% 2.0A (Max.) Cable length : about 1.5m, AC Cable length : about 1.5m
Common section	
Connector	96-pin half pitch connector [M(male)type] PCR-96LMD+ [HONDA TSUSHIN KOGYO CO., LTD.] or equivalence to it
Number of terminals used at the same time	127 terminals (Max.) *7
Power consumption	5VDC 1300mA (Max.) *8
Operating condition *9	0 - 50℃, 10 - 90%RH (No condensation) * When using the attached AC adapter POA200-20-2, it is 0 - 40℃
Physical dimensions (mm)	180(L) x 140(D) x 34(H) (No protrusions)
Weight	400g
Attached cable length	USB Cable 1.8m
Standard	VCCI Class A, CE Marking (EMC Directive Class A, RoHS Directive)

*1 A linearity error approximately 0.1% of full-range may occur when operated at 0℃ or 50℃ ambient temperature.

*2 At the time of the source use of a signal which built in the high-speed operational amplifier.

*3 The required time is indicated in the analog to digital translation of one channel. When AD of two or more channels is converted, time of the a few minutes of the channel is necessary. Conversion time = Number of conversion channelsx2µsec

*4 SPS = Samplings Per Second. The number of data that can be converted in one second is shown.

*5 The USB transfer speed depends on the host PC environment used (OS and USB host controller).

*6 The supplied current is insufficient in the bus power. Please use the attached AC adaptor (POA200-20-2).

*7 As a USB hub is also counted as one device, you cannot just connect 127 USB terminals.

*8 When using the USB hub function, the current supplied to the connected USB device (max. 500mA) is added.

*9 To suppress the heating, ensure that there are spaces for ventilation (about 5cm) around this product.

Installation Environment Requirements

Item		Specifications
Operating ambient temperature		0 - 50℃ *1
Operating ambient humidity		10 - 90%RH (No condensation)
Floating dust particles		Not to be excessive
Corrosive gases		None
Line-noise resistance *2	Line noise	AC line /±2kV (IEC61000-4-4 Level 3, EN61000-4-4 Level 3), Signal line /± 1kV (IEC61000-4-4 Level 3, EN61000-4-4 Level 3)
	Static electricity resistance	Contact discharge / ±4kV (IEC61000-4-2 Level 2, EN61000-4-2 Level 2) Air discharge / ±8kV (IEC61000-4-2 Level 3, EN61000-4-2 Level 3)
Vibration resistance	Sweep resistance	10 - 57Hz / semi-amplitude : 0.15mm, 57 - 150Hz / 2.0G 40 min. each in x, y, and z directions (JIS C60068-2-6 compliant, IEC60068-2-6 compliant)
Impact resistance		147m/s^2 (15G)/11ms/ half-sine (JIS C60068-2-27 compliant, IEC 60068-2-27 compliant)
Standard		VCCI Class A, CE Marking (EMC Directive Class A, RoHS Directive)

*1 When using the Included AC adapter (POA200-20-2), this is 0 - 40℃.

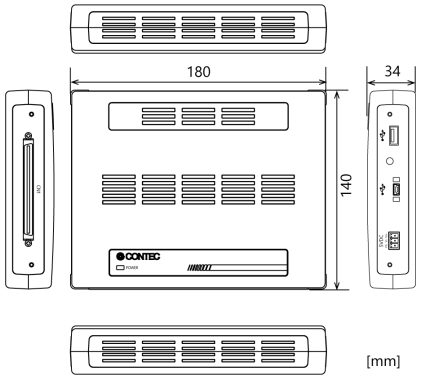
*2 When using the Included AC Adapter (POA200-20-2).

Item	Specifications
Input voltage range	90 - 264VAC
Rated input current	300mA
Number of frequency	50 - 60Hz
Rated output voltage	5.0VDC
Rated output current	2.0A (Max.)
Dimension (mm)	47.5(W) x 75(D) x 27.3(H) (No protrusions)
Weight	175g
Operating temperature	0 - 40℃
Operating humidity	20 - 80%RH(No condensation)
Life expectancy	4 years at the ambient temperature 40 ℃ (When 100VAC is input and 1.3A is output)
Allowable time of short interruption	15ms (Max.) (When 100VAC is input and 1.3A is output) *1
Floating dust particles	Not to be excessive
Corrosive gases	None
Voltage corresponding to the attached AC cable	125VAC 7A

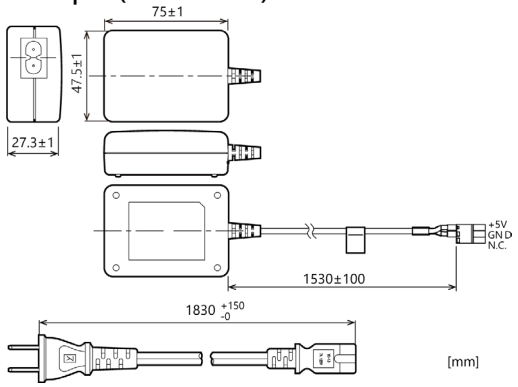
*1 When the short interruption occurs and the defective operation of the equipment is generated, please insert the power supply of the equipment after pulling out it.

Physical Dimensions

Unit only



Included AC adapter (POA200-20-2)



Included Items

Product [AIO-163202FX-USB] ...1
AC Adapter ... 1
AC Cable (for 125VAC) ... 1
USB Cable (1.8m) ... 1
Ferrite Core ... 1
Power Connector (MC1,5/3-ST-3,5) ... 1
USB Cable Attachment on the Main Unit's Side ... 1
Clamps For Prevention of Cable on the Main Unit's Side ... 1
Please read the following ... 1

* Product configuration will change depending on time of purchase.
There are no changes other than those listed below.
Older configurations do not include "Please read the following".
Older configurations include CD-ROM, First Steps Guide, Registration Card & Warranty Card, and Serial Number Label.

Support Softwear

Name	Contents	How to get
Windows Version Analog I/O Driver software API-AIO(WDM)	The Windows device driver is provided as a form of Windows API functions. Various sample programs such as C# and Visual Basic .NET, Visual C++, Python etc. and diagnostic program useful for checking operation is provided.	Download from the CONTEC website *1
Linux Version Analog I/O Driver software API-AIO(LNX)	The Linux device driver is provided as a shared library. The software includes various sample programs such as gcc (C, C++) and Python programs, as well as a configuration tool to configure the device settings.	Download from the CONTEC website *1
Software Development Tool Kits (SDK) and Support Software	In addition to the device drivers, we offer many software programs for using CONTEC devices in an easier manner.	Download from the CONTEC website *2

*1 Download the files from the following URL.
https://www.contec.com/download/

*2 For supported software, search the CONTEC website for this product and view the product page.
https://www.contec.com/

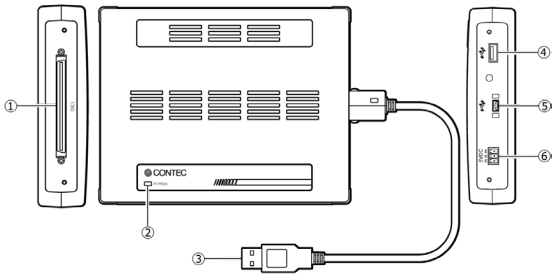
Optional Products

Product Name	Model type	Description
Shielded Cable with Two 96-Pin Half-Pitch Connectors	PCB96PS-0.5P	
	PCB96PS-1.5P	
Flat Cable with 96-pin Half-Pitch Connectors at Both Ends	PCB96P-1.5	
Shielded Cable with One 96-pin Half-Pitch Connector	PCA96PS-0.5P	
	PCA96PS-1.5P	
Flat Cable with One 96-pin Half-Pitch Connector	PCA96P-1.5	
Buffer Amplifier Box for Analog Input Boards	ATBA-32F	*1*2*7
Buffer Amplifier Box for Analog Input Boards	ATBA-8F	*1*2*3*7
Screw Terminal (M3 * 96)	EPD-96A	*1*5
Terminal Unit for Relay Terminal Banks	EPD-96	*1
Screw Terminal	DTP-64A	*1
Termination Panel with BNC connectors for Analog I/O Boards	ATP-32F	*1
Termination Panel with BNC connectors for Analog I/O Boards	ATP-8	*1*3*4
USB I/O Unit Bracket for X Series	BRK-USB-X	
AC-DC Power Adaptor (5VDC, 2A)	POA200-20-2	*6
F&eIT Series DC-DC Power Supply Unit	POW-DD10GY	

1 PCB96PS- optional cable is required separately (0.5mm is recommended).
*2 An external power supply is necessary (optional AC adapter POA200-20-2 prepared.).
*3 The analog input could have 8 channels to be used.
*4 The digital input can be used up to four points, the digital output up to four points and the counter I/O up to 1 channel.
*5 "Spring-up" type terminal is used to prevent terminal screws from falling off.
*6 It is the same as the one appended to the product. Please buy it necessary for maintenance.
*7 When a buffer amp is connected, the pin assignments are different from those for the connector of this product. For the pin assignment, refer to the buffer amp's product manual.

* Visit the CONTEC website for the latest optional products.

Component Name

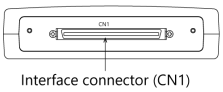


No.	Name	No.	Name
1	Interface Connector	4	USB port (USB Type-A connector)
2	POWER Status	5	USB port (mini B connector)
3	USB Type-A connector	6	+5VDC input terminal

Connecting to an External Device

Connecting an Interface Connector

To connect an external device to this product, plug the cable from the device into the interface connector (CN1) shown below.



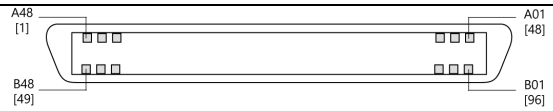
Interface connector (CN1)

- Connector used
PCR-E96LMD+ or equivalence
[mfd. by HONDA TSUSHIN KOGYO CO., LTD.]

- Compatible connectors
PCR-E96FA+ or equivalence
[mfd. by HONDA TSUSHIN KOGYO CO., LTD.]

Signal Layout of Interface Connector (CN1)

Single-Ended Input



Pin No.	Description	Pin No.	Description
B48	N.C.	A48	Analog Output 00
B47	N.C.	A47	Analog Ground (for AO)
B46	N.C.	A46	Analog Output 01
B45	N.C.	A45	Analog Ground (for AO)
B44	Analog Input 08	A44	Analog Input 00
B43	Analog Input 24	A43	Analog Input 16
B42	Analog Input 09	A42	Analog Input 01
B41	Analog Input 25	A41	Analog Input 17
B40	Analog Ground (for AI)	A40	Analog Ground (for AI)
B39	Analog Ground (for AI)	A39	Analog Ground (for AI)
B38	Analog Input 10	A38	Analog Input 02
B37	Analog Input 26	A37	Analog Input 18
B36	Analog Input 11	A36	Analog Input 03
B35	Analog Input 27	A35	Analog Input 19
B34	Analog Ground (for AI)	A34	Analog Ground (for AI)
B33	Analog Ground (for AI)	A33	Analog Ground (for AI)
B32	Analog Input 12	A32	Analog Input 04
B31	Analog Input 28	A31	Analog Input 20
B30	Analog Input 13	A30	Analog Input 05
B29	Analog Input 29	A29	Analog Input 21
B28	Analog Ground (for AI)	A28	Analog Ground
B27	Analog Ground (for AI)	A27	Analog Ground
B26	Analog Input 14	A26	Analog Input 06
B25	Analog Input 30	A25	Analog Input 22
B24	Analog Input 15	A24	Analog Input 07
B23	Analog Input 31	A23	Analog Input 23
B22	Analog Ground (for AI)	A22	Analog Ground (for AI)
B21	Analog Ground (for AI)	A21	Analog Ground (for AI)
B20	Digital Ground	A20	Digital Ground
B19	N.C.	A19	N.C.
B18	Digital Output 00	A18	Digital Input 00
B17	Digital Output 01	A17	Digital Input 01
B16	Digital Output 02	A16	Digital Input 02
B15	Digital Output 03	A15	Digital Input 03
B14	Digital Output 04	A14	Digital Input 04
B13	Digital Output 05	A13	Digital Input 05
B12	Digital Output 06	A12	Digital Input 06
B11	Digital Output 07	A11	Digital Input 07
B10	AO Control Signal Output 00	A10	AI Control Signal Output 00
B09	AO Control Signal Output 01	A09	AI Control Signal Output 01
B08	Digital Ground	A08	Digital Ground
B07	AO External Generating Clock Input	A07	AI External Sampling Clock Input
B06	AO External Stop Trigger Input	A06	AI External Stop Trigger Input
B05	AO External Start Trigger Input	A05	AI External Start Trigger Input
B04	Counter UP Clock Input 01	A04	Counter UP Clock Input 00
B03	Reserved	A03	Reserved
B02	Counter Gate Control Input 01	A02	Counter Gate Control Input 00
B01	Control Output 01	A01	Counter Output 00

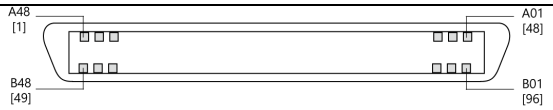
* [ ] shows pin numbers specified by HONDA TSUSHIN KOGYO CO., LTD

Signal name	Description
Analog Input00 - Analog Input31	Analog input signal. The numbers correspond to channel numbers.
Analog Output00 - Analog Output01	Analog output signal. The numbers correspond to channel numbers.
Analog Ground	Common analog ground for analog I/O signals.
AI External Start Trigger Input	External trigger input for starting analog input sampling.
AI External Stop Trigger Input	External trigger input for stopping analog input sampling.
AI External Sampling Clock Input	External sampling clock input for analog input.
AI Control Signal Output 00	External sampling clock output signal for analog input.
AI Control Signal Output 01	External output signal for analog input status. Not currently connected.
AO External Start Trigger Input	External trigger input for starting analog output generating.
AO External Stop Trigger Input	External trigger input for stopping analog output generating.
AO External Generating Clock Input	External generating clock input for analog output.
AO Control Signal Output 00	External generating clock output signal for analog output.
AO Control Signal Output 01	External output signal for analog output status. Not currently connected.
Digital Input00 - Digital Input07	Digital input signal.
Digital Output00 - Digital Output07	Digital output signal.
Counter Gate Control Input00 - Counter Gate Control Input01	Gate control input signal for counter.
Counter Up Clock Input00 - Counter Up Clock Input01	External Up-Clock Input Signal for Counter.
Counter Output00 - Counter Output01	Count match output signal for counter.
Digital Ground	Common digital ground for digital I/O signals, external trigger inputs, external sampling clock inputs, and counter I/O signals.
Reserved	Reserved pin
N.C.	No connection to this pin.

⚠ CAUTION

- Do not connect any of the outputs and power outputs to the analog or digital ground. Neither connect outputs to each other. Doing either can result in a fault.
- If analog and digital ground are shorted together, noise on the digital signals may affect the analog signals. Accordingly, analog and digital ground should be separated.
- Leave "Reserved" pins unconnected. Connecting these pins may cause a fault in the product.
- When the Buffer Amplifier Box is used, pin assignments are different. Refer to the pin assignments for the connector on the Buffer Amplifier Box.○

Differential Input



Pin No.	Description	Pin No.	Description
B48	N.C.	A48	Analog Output 00
B47	N.C.	A47	Analog Ground (for AO)
B46	N.C.	A46	Analog Output 01
B45	N.C.	A45	Analog Ground (for AO)
B44	Analog Input 08[+]	A44	Analog Input 00[+]
B43	Analog Input 08[-]	A43	Analog Input 00[-]
B42	Analog Input 09[+]	A42	Analog Input 01[+]
B41	Analog Input 09[-]	A41	Analog Input 01[-]
B40	Analog Ground (for AI)	A40	Analog Ground (for AI)
B39	Analog Ground (for AI)	A39	Analog Ground (for AI)
B38	Analog Input 10[+]	A38	Analog Input 02[+]
B37	Analog Input 10[-]	A37	Analog Input 02[-]
B36	Analog Input 11[+]	A36	Analog Input 03[+]
B35	Analog Input 11[-]	A35	Analog Input 03[-]
B34	Analog Ground (for AI)	A34	Analog Ground (for AI)
B33	Analog Ground (for AI)	A33	Analog Ground (for AI)
B32	Analog Input 12[+]	A32	Analog Input 04[+]
B31	Analog Input 12[-]	A31	Analog Input 04[-]
B30	Analog Input 13[+]	A30	Analog Input 05[+]
B29	Analog Input 13[-]	A29	Analog Input 05[-]
B28	Analog Ground (for AI)	A28	Analog Ground (for AI)
B27	Analog Ground (for AI)	A27	Analog Ground (for AI)
B26	Analog Input 14[+]	A26	Analog Input 06[+]
B25	Analog Input 14[-]	A25	Analog Input 06[-]
B24	Analog Input 15[+]	A24	Analog Input 07[+]
B23	Analog Input 15[-]	A23	Analog Input 07[-]
B22	Analog Ground	A22	Analog Ground (for AI)
B21	Analog Ground	A21	Analog Ground (for AI)
B20	Digital Ground	A20	Digital Ground
B19	N.C.	A19	N.C.
B18	Digital Output 00	A18	Digital Input 00
B17	Digital Output 01	A17	Digital Input 01
B16	Digital Output 02	A16	Digital Input 02
B15	Digital Output 03	A15	Digital Input 03
B14	Digital Output 04	A14	Digital Input 04
B13	Digital Output 05	A13	Digital Input 05
B12	Digital Output 06	A12	Digital Input 06
B11	Digital Output 07	A11	Digital Input 07
B10	AO Control Signal Output 00	A10	AI Control Signal Output 00
B09	AO Control Signal Output 01	A09	AI Control Signal Output 01
B08	Digital Ground	A08	Digital Ground
B07	AO External Generating Clock Input	A07	AI External Sampling Clock Input
B06	AO External Stop Trigger Input	A06	AI External Stop Trigger Input

B05	AO External Start Trigger Input	A05	AI External Start Trigger Input
B04	Counter UP Clock Input 01	A04	Counter UP Clock Input 00
B03	Reserved	A03	Reserved
B02	Counter Gate Control Input 01	A02	Counter Gate Control Input 00
B01	Counter Output 01	A01	Counter Output 00

* [ ] shows pin numbers specified by HONDA TSUSHIN KOGYO CO., LTD

Signal name	Description
Analog Input00 - Analog Input15	Analog input signal. The numbers correspond to channel numbers.
Analog Output00 - Analog Output01	Analog output signal. The numbers correspond to channel numbers.
Analog Ground	Common analog ground for analog I/O signals.
AI External Start Trigger Input	External trigger input for starting analog input sampling.
AI External Stop Trigger Input	External trigger input for stopping analog input sampling.
AI External Sampling Clock Input	External sampling clock input for analog input.
AI Control Signal Output 00	External sampling clock output signal for analog input.
AI Control Signal Output 01	External output signal for analog input status. Not currently connected.
AO External Start Trigger Input	External trigger input for starting analog output generating.
AO External Stop Trigger Input	External trigger input for stopping analog output generating.
AO External Generating Clock Input	External generating clock input for analog output.
AO Control Signal Output 00	External generating clock output signal for analog output.
AO Control Signal Output 01	External output signal for analog output status. Not currently connected.
Digital Input00 - Digital Input07	Digital input signal.
Digital Output00 - Digital Output07	Digital output signal.
Counter Gate Control Input00 - Counter Gate Control Input01	Gate control input signal for counter.
Counter Up Clock Input00 - Counter Up Clock Input01	External Up-Clock Input Signal for Counter.
Counter Output00 - Counter Output01	Count match output signal for counter.
Digital Ground	Common digital ground for digital I/O signals, external trigger inputs, external sampling clock inputs, and counter I/O signals.
Reserved	Reserved pin
N.C.	No connection to this pin.

⚠ CAUTION

- Do not connect any of the outputs and power outputs to the analog or digital ground. Neither connect outputs to each other. Doing either can result in a fault.
- If analog and digital ground are shorted together, noise on the digital signals may affect the analog signals. Accordingly, analog and digital ground should be separated.
- Leave "Reserved" pins unconnected. Connecting these pins may cause a fault in the product.
- When the Buffer Amplifier Box is used, pin assignments are different. Refer to the pin assignments for the connector on the Buffer Amplifier Box.

Analog Input Signal Connection

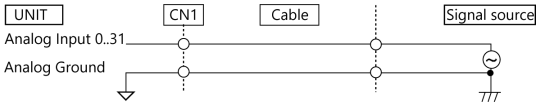
The procedure for connecting analog signals depends on whether the analog input signals are single-ended or differential. The sections below describe how to connect the signals using flat cable and shielded cable.

Single-ended Input

Flat Cable

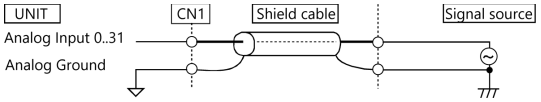
The following figure shows an example of flat cable connection.

Connect separate signal and ground wires for each analog input channel on CN1.



Shielded Cable

The following figure shows an example of shield cable connection. Use shielded cable if the distance between the signal source and unit is long or if you want to provide better protection from noise. For each analog input channel on CN1, connect the core wire to the signal line and connect the shielding to ground.



⚠ CAUTION

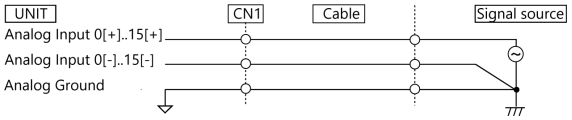
- If the signal source contains over 1MHz signals, the signal may effect the cross-talk noise between channels.
- If the unit and the signal source receive noise or the distance between the unit and the signal source is too long, data may not be input properly.
- An input analog signal should not exceed the maximum input voltage (relate to the product analog ground). If it exceeds the maximum voltage, the unit may be damaged.
- Connect all the unused analog input channels to analog ground.
- In the channel switching, the multiplexer does the electrical charge and discharge on the internal capacitor according to the signal voltage. Therefore, the voltage from the previous switching state may go into the next channel. It might cause the error of the signal source action. If this occurs, insert a high-speed amplifier as a buffer between the signal source and the analog input pin to reduce the fluctuation.
- An input pin may fail to obtain input data normally when the signal source connected to the pin has high impedance. If this is the case, change the signal source to one with lower output impedance or insert a high-speed amplifier buffer between the signal source and the analog input pin to reduce the effect.

Differential Input

Flat Cable

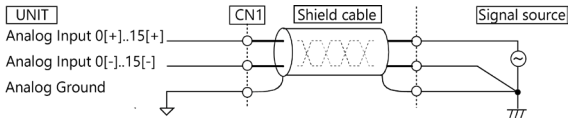
The following figure shows an example of flat cable connection.

For each analog input channel on CN1, connect the "+" input to the signal and connect the "-" input to the signal source ground. Also connect the analog ground on the unit to the signal source ground.



Shielded Cable

The following figure shows an example of shielded cable connection. Use shielded cable if the distance between the signal source and unit is long or if you want to provide better protection from noise. For each analog input channel on CN1, connect the "+" input to the signal and connect the "-" input to the signal source ground. Also connect the analog ground on the unit and the signal source ground to the shielding.



⚠ CAUTION

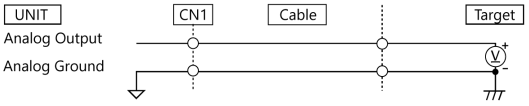
- If the signal source contains over 1MHz signals, the signal may effect the cross-talk noise between channels.
- When the analog ground is not connected, the conversion data is not determined.
- If the unit and the signal source receive noise or the distance between the unit and the signal source is too long, data may not be input properly.
- An input analog signal should not exceed the maximum input voltage (relate to the unit analog ground). If it exceeds the maximum voltage, the unit may be damaged.
- Connect all the unused analog input channels to analog ground.
- In the channel switching, the multiplexer does the electrical charge and discharge on the internal capacitor according to the signal voltage. Therefore, the voltage from the previous switching state may go into the next channel. It might cause the error of the signal source action. If this occurs, insert a high-speed amplifier as a buffer between the signal source and the analog input pin to reduce the fluctuation.
- An input pin may fail to obtain input data normally when the signal source connected to the pin has high impedance. If this is the case, change the signal source to one with lower output impedance or insert a high-speed amplifier buffer between the signal source and the analog input pin to reduce the effect.

Analog Output Signal Connection

This section shows how to connect the analog output signal by using a flat cable or a shield cable.

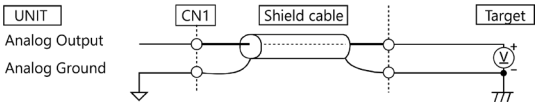
Flat Cable

The following figure shows an example of flat cable connection.
Connect the signal source and ground to the CN1 analog output.



Shielded Cable

The following figure shows an example of shield cable connection. Use shield cable if the distance between the signal source and this product is long or if you want to provide better protection from noise. For the CN1 analog output, connect the core wire to the signal line and connect the shielding to ground.



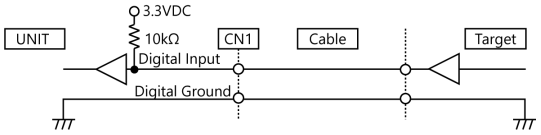
⚠ CAUTION

- If this product or the connected wire receives noise, or the distance between this product and the target is long, data may not be outputted properly.
- For analog output signal, the current capacity is ±5mA (Max.). Check the specification of the connected device before connecting this product.
- Do not short the analog output signal to analog ground, digital ground, and/or power line. Doing so may damage this product.
- Do not connect an analog output signal to any other analog output, either on this product or on an external device, as this may cause a fault on this product.
- Analog output signal outputs hundreds of μ voltages when USB cable is inserted.

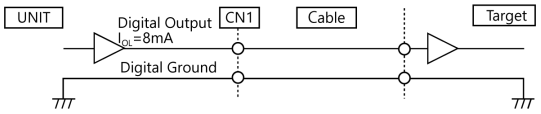
Digital I/O signals, Counter signals and Control signals Connection

The following sections show examples of how to connect digital I/O signals, counter I/O signals, and other control I/O signals (external trigger input signals, sampling clock input signals, etc.).
All the digital I/O signals and control signals are LVTTL level signals.

Digital Input Connection



Digital Output Connection



About the counter input control signal

Counter Gate Control Input acts as an input that validate or invalidate the input of an external up-clock for counter. This function enables the control of an external up-clock for counter. The external up-clock for counter is valid when input is "High", and invalid when input is "Low". If unconnected, it is a pull-up in the product and remains "High". Therefore the external up-clock for counter is valid when the counter gate control input is not connected.

⚠ CAUTION

- Do not short the output signals to analog ground, digital ground, and/or power line. Doing so may damage the product.
- If connected to each output, a pull-up resistor must be about 10kΩ to pull up with a 3.3V power source.
- Each input accepts 5V TTL signals.

Differences between this product and our earlier models.

There are differences from AIO-163202F-PE, ADA16-32/2(PCI)F in the specifications of this product.

Item		AIO-163202FX-USB	AIO-163202F-PE	ADA16-32/2(PCI)F
Analog input				
	Buffer memory	128k data FIFO or 128k data RING	64k data FIFO or 64k data RING	
	External start signal, External stop signal, External clock signal	LVTTL level 5V input available		TTL level
	External status output signal	LVTTL level		TTL level
Analog output				
	memory	128k data FIFO or 128k data RING	64k data FIFO or 64k data RING	
	External start signal, External stop signal, External clock signal	LVTTL level 5V input available		TTL level
	External status output signal	LVTTL level		TTL level
Digital I/O				
	Number of input channels	Non-isolated input 8 channels (LVTTL level positive logic)		Non-isolated input 8 channels (TTL level positive logic)
	Number of output channels	Non-isolated output 8 channels (LVTTL level positive logic)		Non-isolated output 8 channels (TTL level positive logic)
Counter				
	Number of external inputs	LVTTL level		TTL level
	Number of external outputs	LVTTL level		TTL level
Bus master transfer function		None	Have	
Sync signal control connectors		None	Have	Have
Connector		96-pin half pitch connector [M (male) type]		96-pin half pitch connector [M(male) type]
Power consumption (Max.)		5VDC 1300mA	3.3VDC 500mA, 12VDC 300mA	5VDC 1100mA
Bus specification		USB Specification 2.0/1.1 standard	PCI Express Base Specification Rev. 1.0a x1	PCI(32bit, 33MHz, Universal key shapes supported)
Physical dimensions (mm)		180(L) x 140(D) x 34(H) (No protrusions)	169.33(L) x 110.18(H)	176.41(L) x 105.68(H)
Weight		400g	140g	130g