

Isolated High precision Analog Output Module
for USB2.0

DAI16-4(USB)



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

Features

Conversion speed voltage : 10μsec, current : 20μsec, 16 bit resolution, analog output 4ch

This product includes analog outputs (voltage : 10μsec, current : 20μsec, 16 bit resolution, analog output 4ch). Compatible to USB1.1/USB2.0 and capable to achieve high speed transfer at HighSpeed (480 Mbps). The voltage or current output range set (voltage : +/-10V, current : 0 - 20mA). The range is set by software and switch.

Isolated from the bus by a digital isolator

This product is isolated by a digital isolator which improves the noise performance with respect to the PC.

Equipped with the buffer memory (256K data) which can be used in either FIFO or ring format

This product includes buffer memory (256K data for analog input) which can be used in either FIFO or ring format. You can perform analog output in the background, independent of software and the current status of the PC.

Windows compatible driver libraries are attached.

Using the attached driver library API-USBP(WDM) makes it possible to create applications of Windows. In addition, a diagnostic program by which the operations of hardware can be checked is provided.

Output signal can be controlled by a clock or various trigger conditions

The output signal can be started and stopped by software trigger. The sampling period can be controlled by the internal clock (high-precision timer included on the board).

Easy to increase the output channels using an expansion module

Adding optional modules (up to 3 units) can easily increase the output channels. The unique structure for connection by stacking enables easy and compact system configuration.

LabVIEW is supported by a plug-in of dedicated library

Using the dedicated library makes it possible to create each application for LabVIEW.

This product is a USB2.0 compatible terminal module that extends the analog output function of USB port of PCs. This product features 4ch 16-bit analog output and is isolated from the bus line to the PC. The signal lines can be connected directly to the terminals on this product. To simplify use in embedded applications, this product includes a bracket for attaching to a 35mm DIN rail. The number of output channels can be increased by purchasing an optional device module. Windows driver is bundled with this product.

Specification

Hardware Specification

Item	Specification
Analog output	
Output format	Bus-isolated voltage/current output
Output range	Voltage: Bipolar ±10V (output current ±5mA) Current: 0 - 20mA
Output impedance	Voltage range: 10Ω (Max.)
Output channel	4 channels
Resolution	16 bits
Conversion accuracy	Voltage: ±18LSB Current: ±18LSB
Conversion rate	Voltage: 10msec *1 Current: 20msec *1
Data buffer	256K data (262,144 data)
Internal sampling timer	10μsec - 1,073,741,824μsec *2
Communication	
USB transmission speed	12Mbps(full speed), 480Mbps(high speed) *3
Current consumption	+5VDC 800mA(Max.) *4
Others	
Number of modules used at the same time	127 modules (Max.) *5
Use condition	0 - 50°C, 10 - 90%RH(No condensation)
Physical dimensions (mm)	50.4(W) x 64.7(D) x 94.0(H) (exclusive of protrusions)
Weight of the module itself	100g
Module installation method	One-touch connection to 35mm DIN rails (standard connection mechanism provided in the system)
Expansion module	DAI16-4(FIT)GY : 3 modules (Max.), Current consumption per one module : +5VDC 500mA(Max.)
Compatible plug	FRONT-MC 1.5/12-STF-3,81 (made by Phoenix Contact) 3.81mm-pitch nominal current: 4A(Max.)
Applicable wire	AWG28 - 16
Bundled AC adapter (POA200-20)	90 - 264VAC 5.0VDC±5% 2.0A(Max.) Length of cable is about 1.5m. Length of AC cable is about 1.5m.

*1 Converting speed of D/A converter. The minimum executable outputting period is depending on internal processing time and is about 200μsec (using one channel) to 1msec (using 16 channels). (Measured values: The period may be longer due to factors such as the load on the USB link.)
 *2 It takes the unit of 1000μsec (1000μsec, 2000μsec, 3000μsec, ...) when expansion module (DAI16-4(FIT)GY) being used.
 *3 USB module executes API function by USB communication. The executing time of API function by USB communication is about several msec in practice (Depending on the contents handled by API function, it may be longer than that). The responding speed of USB module is based on the environment of the host PC being used.
 *4 Always use the supplied AC adapter or power supply unit (option).
 *5 The USB interface can accommodate up to 127 devices on the bus. As a USB hub itself is counted as one device, however, 127 USB modules cannot be connected.

Windows Driver Specification

Item	Specification
Support OS	Microsoft Windows 98 or Second Edition Microsoft Windows Me Microsoft Windows 2000 Professional Microsoft Windows Server 2003 Microsoft Windows XP Professional, Home Edition Microsoft Windows Vista
Support language	Microsoft Visual C++ Ver 5.0, Ver6.0 Microsoft Visual C++ .NET 2002, 2003 Microsoft Visual Basic Ver 5.0, Ver6.0 Microsoft Visual Basic .NET 2002, 2003 Microsoft Visual C# .NET 2002, 2003 Borland Delphi Ver 5.0, 6.0 Borland C++ Builder Ver 5.0, 6.0
System requirement	-PC (IBM PC/AT compatibility, DOS/V) with USB port -CD-ROM drive -Recommend the environment on which the using language can run smoothly

Support Software

Driver Library API-USBP(WDM) (Bundled)

It is the library software, and which supplies command of hardware produced by our company in the form of standard Win32 API function(DLL). Using programming languages supporting Win32API functions, such as Visual Basic and Visual C++ etc., you can develop high-speed application software with feature of hardware produced by our company. In addition, you can verify the operation of hardware using Diagnostic programs. CONTEC provides download services (at <http://www.contec.com/apiusbp/>) to supply the updated drivers and differential files. Further details may be found in the help within supplied CD-ROM or the homepage of our company.

< Operating environment >

OS Windows Vista, XP, Server 2003, 2000, Me, 98
Adaptation language Visual Basic, Visual C++, Visual C#, Delphi, C++ Builder

Data acquisition VI library for LabVIEW VI-DAQ (Available for downloading (free of charge) from the CONTEC web site.)

This is a VI library to use in National Instruments LabVIEW. VI-DAQ is created with a function form similar to that of LabVIEW's Data Acquisition VI, allowing you to use various devices without complicated settings. See <http://www.contec.com/vidaq/> for details and download of VI-DAQ.

Accessories

Accessories (Option)

- Isolated analog input module : DAI16-4(FIT)GY
(Expansion module for DAI16-4(USB))
- AC adapter
(input: 90 - 264VAC, output: 5VDC 2.0A): POA200-20
- AC-DC power supply unit
(input: 85 - 132VAC, output: 5VDC 3.0A): POW-AC13GY
- AC-DC power supply unit
(input: 85 - 264VAC, output: 5VDC 2.0A): POW-AD22GY
- DC-DC power supply unit
(input: 10 - 30VDC, output: 5VDC 3.0A) : POW-DD10GY
- DC-DC power supply unit
(input: 30 - 50VDC, output: 5VDC 3.0A) : POW-DD43GY

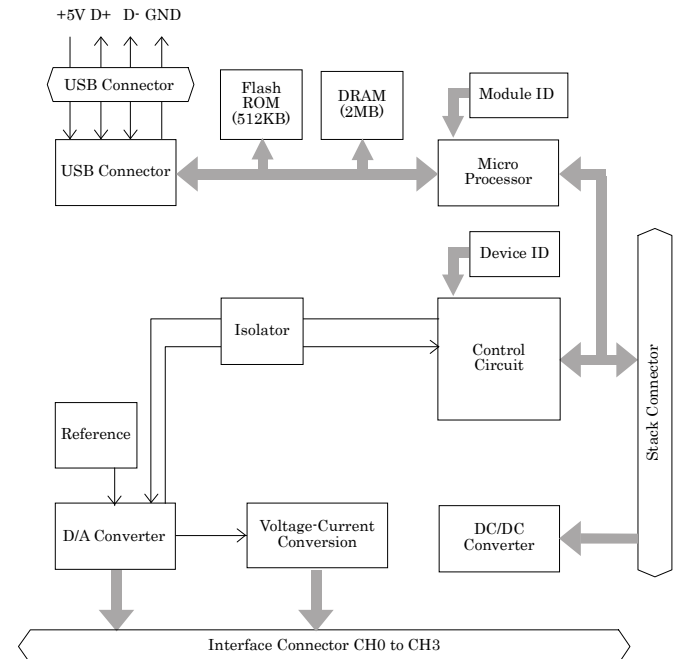
* Check the CONTEC's Web site for more information on these options.

Packing List

- USB module [DAI16-4(USB)] ...1
- First step guide ...1
- CD-ROM *1 [API-USBP(WDM)] ...1
- Interface connector (plugs) FRONT-MC 1,5/12-STF-3,81 ...1
- AC adapter (1.5m)...1
- AC cable (1.5m)...1
- USB cable (1.8m)...1
- Rubber feet...4
- Magnet...2
- Shield cover...1

*1 The CD-ROM contains the driver software and User's Guide.

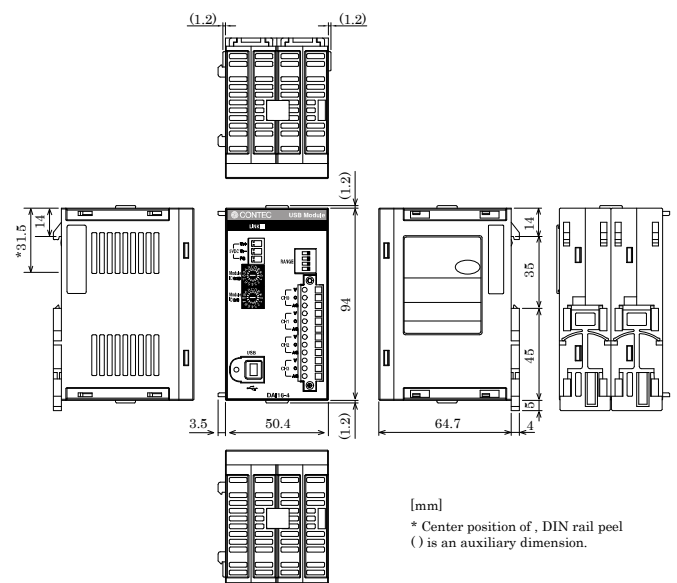
Block Diagram



Point

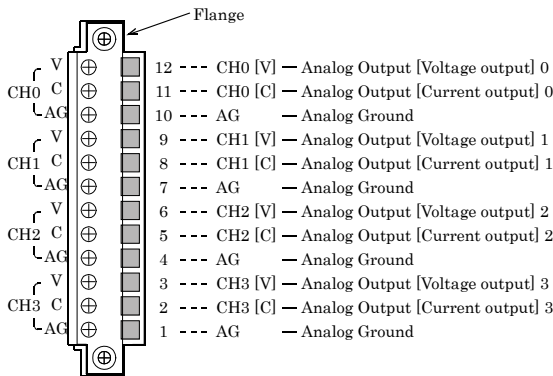
The Device ID of the USB module DAI16-4(USB) is fixed at "0".

Physical Dimensions



Signal Layout

The Module can be connected to an external device using a 12-pin (1 group) connector that is provided on the Module face.

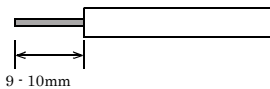
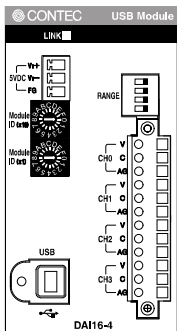


Connection Method

When connecting the Module to an external device, you can use the supplied connector plug. When wiring the Module, strip off approximately 9 - 10 mm of the covering for the cable, and insert the bare wire by pressing the orange button on the connector plug. Releasing the orange button after the wire is inserted fixes the cable. Compatible wires are AWG 28 - 16.

CAUTION

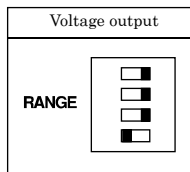
Removing the connector plug by grasping the cable can break the wire.



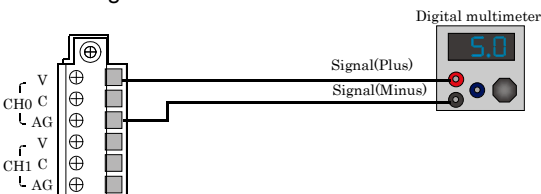
- Applicable connector
3.81mm-pitch, 12-pin type of rated current 8A
MC-1,5/12-GF-3,81 [Made by Phoenix Contact]
- Applicable plug(accessory bundled)
Front-screw type with connector locking flange
FRONT-MC 1,5/12-STF-3,81 [Made by Phoenix Contact]
Applicable cable AWG28-16

Input the voltage output to the external device.

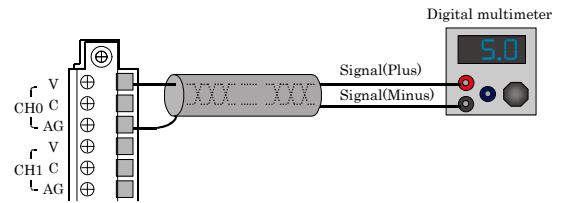
Set the range setting switch and software setting to voltage output.



The figure below shows an example of connecting to a digital multimeter using flat cable.



Use coaxial cable in cases such as when the distance to the external device is long or you want to minimize noise. Connect the core and shield of the coaxial cable to the voltage output and analog ground respectively for each channel and connect these to the input and ground terminals on the external device.



CAUTION

The voltage output initially goes to 0V when the power is turned on or the USB cable is plugged in.

Never short circuit a voltage output signal to analog ground as this may damage the module.

Never connect a voltage output signal to another analog output signal or to the output of an external device.

Never insert or remove the connector plug while the power is turned on to the module or external device as this may result in damage.

The maximum output current capacity of the voltage output signal is +/-5mA. Never connect the output to an external device with a load that will result in this level being exceeded as this may damage the module.

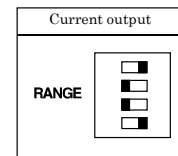
The voltage output may not be accurate if the connection cable is affected by noise. Always locate the connection cable away from noise sources.

An excessively long connecting cable can fail to ensure accurate voltage output. The connecting cable should be as short as possible.

Glitches may occur as the D/A converters in the module do not have internal deglitchers.

Control external devices using current loop

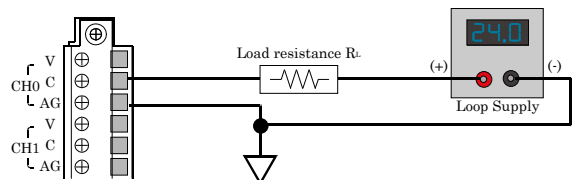
Set the range setting switch and software setting to current output.



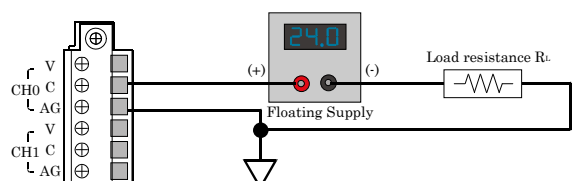
The two types of load able to be controlled using current loop are fixed load and floating load. If using a floating load, multiple current loops can be implemented using a common power supply. An external power supply (10 - 24V) is required to use current output. As ripple on the power supply will affect the conversion accuracy, please use a power supply with low ripple.

Also, ensure that the load resistor R_L connected to each current output channel is 500Ω or less, including the resistance of the cabling.

Connection to a Floating Load



Connection to a Fixed Load



⚠ CAUTION

When the power is turned on or the module is reset, the current output signal will be 10mA.

To avoid any malfunction, the current output signal should not be connected to the analog ground.

To avoid any malfunction, the current output signal should not be connected to another analog output signal or the output signal of an external device.

To avoid any malfunction, the connector plug should not be attached or detached when the power for the module or the external device is on.

In situations where the connecting cable is subject to the effects of noise, the accurate current output can fail. The connecting cable should be installed away from any source of noise.

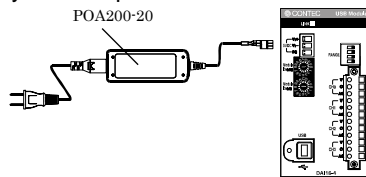
Connecting an External Power Supply

This module must be connected with an external power supply (in a self-powered state).

Connect the external power supply to the +5 VDC input terminal.

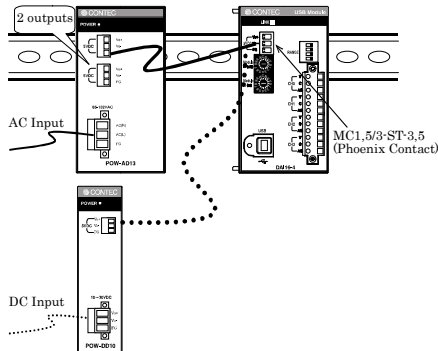


When using the supplied AC adapter [POA200-20], please connect directly to the input terminals.



Beside the AC adapter, a power supply for installation on a DIN rail is also available (as an option). Use the appropriate power supply depending on the operating environment and application.

Category	Model	Input	Output	External dimensions(mm)	DIN rail
AC adapter	POA200-20 (Bundled)	90 - 264VAC	5.0VDC±5% 2.0A(Max.)	40.0(W) x 105.0(D) x 30.0(H) (exclusive of protrusions)	No
AC-DC power	POW-AD13GY	85 - 132VAC	5.0VDC±5% 3.0A(Max.)	52.4(W)x64.7(D)x94.0(H) (exclusive of protrusions)	Yes
AC-DC power	POW-AD22GY	85 - 265VAC	5.0VDC±5% 2.0A(Max.)	52.4(W)x64.7(D)x94.0(H) (exclusive of protrusions)	Yes
DC-DC power	POW-DD10GY	10 - 30VDC	5.0VDC±5% 3.0A(Max.)	25.2(W)x64.7(D)x94.0(H) (exclusive of protrusions)	Yes
DC-DC power	POW-DD43GY	30 - 50VDC	5.0VDC±5% 3.0A(Max.)	25.2(W)x64.7(D)x94.0(H) (exclusive of protrusions)	Yes



For the power supply for installation on a DIN rail, use the connector MC1,5/3-ST-3,5 (Phoenix Contact).

Connecting method

To connect the external power supply and USB cable to the unit, take the steps below:

- (1) Connect the external power supply connector to supply power to the USB module.
- (2) Use the USB cable to connect the USB module to the PC.

To remove the external power supply and USB cable from the unit, take the steps below:

- (1) Unplug the USB cable.
- (2) Remove the external power supply connector to stop power supply to the USB module.

⚠ CAUTION

To use the AC adapter, connect it to the USB module first, then plug the AC adapter's connector into a wall outlet.

When the USB module is not used, leave the AC adapter unplugged.

Continuously using the AC adapter heated affects its life.

Use the AC adapter not in a closed place but in a well-ventilated place not to be heated. The AC adapter heats up itself when loaded heavily. If the AC adapter is exposed to high temperature or used continuously, you should keep the load at about 80% of the maximum load (at 1.6 A for the POA200-20).

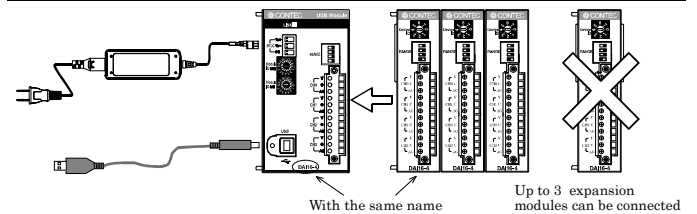
Connecting with Expansion Accessories

When lacking of analog output channel used to connecting external device, you have to purchase a new same module, and thus it not only increases cost but also doubles installation space. At the same time, adding channels is considered when designing this module, and additional module can be connected by the connector on module side, so that not only the cost but also the installation space are controlled.

Up to 3 modules DAI16-4(FIT)GY can be connected when adding channels.

In the case of combination of the USB module “DAI16-4(USB)” and three expansion modules “DAI16-4(FIT)GY”, it is possible to control 16 channels input by way of one USB port.

Model	Output channel	Current consumption	Function
DAI16-4(FIT)GY	4	+5VDC 500mA(Max.)	Expansion module for DAI16-4(FIT)GY



Point

Up to 3 modules can be connected.

If you add three or more expansion modules, the AC adapter cannot supply sufficient power. In that case, use another higher-capacity power supply instead.

Modules with different function from the USB module can not be connected.

The analog grounds of both USB module and expansion module are isolated from each other.