Isolated Digital I/O Module
for USB2.0

DIO-8/8(USB)GY

RoHS Compliant

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

This product is a USB 2.0 compliant module that extends the digital signal I/O functions of a PC.
This product is a 12 - 24VDC opto-coupler isolated type with input 8ch and open-collector output 8ch.
Using the expansion module available as an option can increase the number of I/O channels. In addition, this product has an attachment that allows this product to be directly attached onto 35-mm DIN rails useful for embedded applications. Windows driver is bundled with this product.
Possible to be used as a data recording device for LabVIEW, with dedicated libraries.

Features

Opto-coupler isolated input (supporting current sink output and current source output) and opto-coupler isolated open-collector output (current sink type)
This product has the opto-coupler isolated input 8ch (supporting current sink output and current source output) whose response speed is 1msec and opto-coupler isolated open-collector output 8ch (current sink type).
Common terminal provided per 8ch, capable of supporting a different external power supply
Supporting driver voltages of 12 - 24 VDC for I/O

Conforming to the USB1.1 and USB2.0 Standards and supporting the internal and external power supplies
Compatible to USB1.1/USB2.0 and capable to achieve high speed transfer at HighSpeed (480 Mbps).
Not necessary to power this product externally as the bus power of USB is used. Capable of accepting an external power supply (optional AC adapter) when lower power consumption is required, e.g., for use with a notebook PC

Opto-coupler bus isolation
As the USB (PC) is isolated from the input and output interfaces by opto-couplers, this product has excellent noise performance.

Trigger monitor function integrated
The CPU inside the module can report status changes (rise and fall) to the host in a minimum cycle of 1msec.

Easy to increase the number of I/O channels using an expansion module
Adding optional modules (up to 3 units) can easily increase the number of I/O channels. The unique structure for connection by stacking enables easy and compact system configuration.

Screw-less connector plug facilitating wiring and plugging/unplugging
Wiring and plugging/unplugging are easy as the screw-less connector plug is used.

Capable of being mounted on 35-mm DIN rails
The module is equipped with an attachment for mounting on 35-mm DIN rails on the back, allowing the module to be attached onto and detached from DIN rails.

LabVIEW is supported by a plug-in of dedicated library VI-DAQ.
Using the dedicated library VI-DAQ makes it possible to create each application for LabVIEW.

Product Specification

Hardware Section

Item		Specification
Input section		
Input format		opto-isolated input
		Compatible with current sink output: negative logic *1
		Compatible with current source output: positive logic *2
Number of input signal points		8 points (8 points/common)
Input resistance		3kΩ
Input ON current		3.4mA (Min.)
Input OFF current		0.16mA (Max.)
Response time		1msec (Max.) *3
External power		12V - 24VDC (±15%)
Allowable distance of signal extension		Approx. 50m (depending on wiring environment)
Output section		
Output format		Opto-isolated open collector output (current sink type) (negative *1)
Output rating	Output voltage	12V - 24VDC (±15%)
	Output current	Max. 150mA (per point)
Number of output signal points		8 points (8 points/common)
Response time		1msec (Max.) *3
External power		12V - 24VDC (±5%)
Allowable distance of signal extension		Approx. 50m (depending on wiring environment)
Communication		
USB transmission speed		12Mbps (full speed), 480Mbps (high speed) *3
Current consumption		+5VDC 450mA (Max)
Others		
Number of modules used at the same time		127 modules (Max.) *4
Use condition		0 - 50℃ 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		DIO-8/8(FIT)GY: 3 modules (Max.) consumption current per module: +5VDC 150mA (Max.)
Compatible plug		FK-MC0,5/9-ST-2,5 (made by Phoenix Contact corp.)
		2.5mm-pitch nominal current: 4A (Max.)
Compatible wires		AWG28 - 20

*1 Data"0" corresponds to high-level and data"1"corresponds to low-level.
*2 Data"1"corresponds to high-level and data"0" corresponds to low-level.
*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 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 together.

Software Specification

Item	Specification
Support OS	Microsoft Windows 98 or Second Edition Microsoft Windows Me Microsoft Windows 2000 Professional Microsoft Windows XP Professional, Home Edition Microsoft Windows Vista
Support language	Microsoft Visual C++ Ver 5.0, Ver 6.0 Microsoft Visual C++ .NET 2002, 2003 Microsoft Visual Basic Ver 5.0, Ver 6.0 Microsoft Visual Basic .NET 2002, 2003 Microsoft Visual C# .NET 2002, 2003 Borland Delphi Ver 5.0, Ver 6.0 Borland C++ Builder Ver 5.0, Ver 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

Accessories

Accessories (Option)

Isolated digital I/O module   : DIO-8/8(FIT)GY
(Expansion module)

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
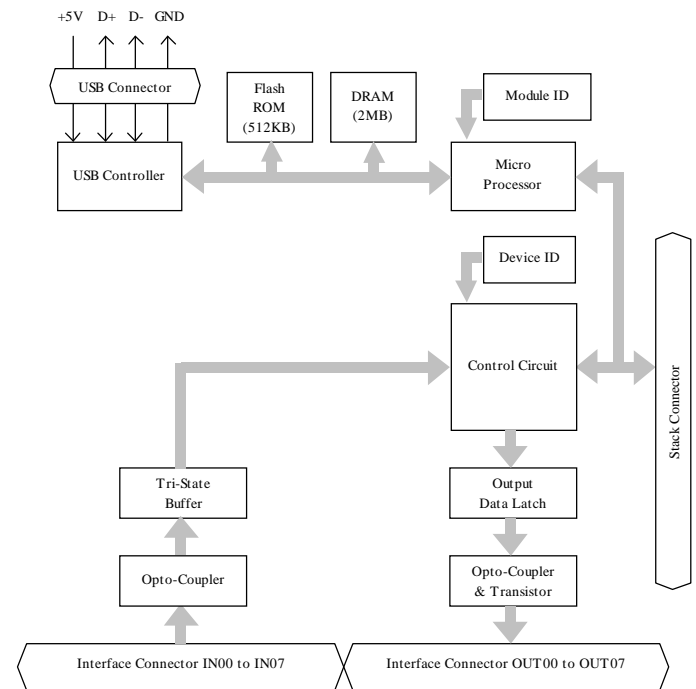(input: 30 - 50VDC, output: 5VDC 3.0A)   : POW-DD43GY

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

Packing List

USB module [DIO-8/8(USB)GY] …1
First step guide … 1
CD-ROM *1 [API-USBP(WDM)]…1
Interface connector (plugs) FK-MC0,5/9-ST-2.5…2
Power connector MC1,5/3-ST-3,5 …1…1
USB cable (1.8m)…1
Rubber feet…4
Magnet…2

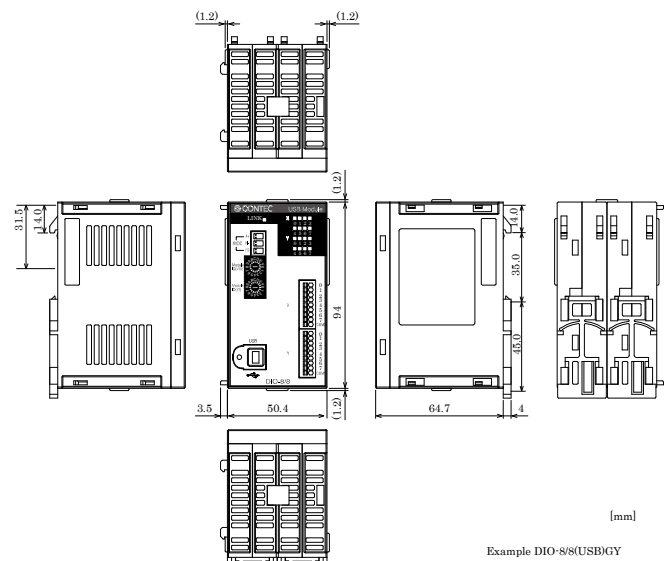*1   The CD-ROM contains the driver software and User's Guide.

Block Diagram

Points

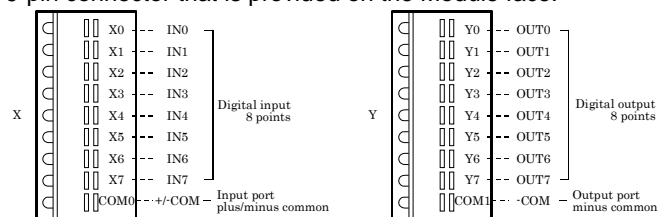The Device ID of the system module DIO-8/8(USB)GY is fixed at "0".

Physical Dimensions

[mm]

Example DIO-8/8(USB)GY

Signal Layout

The Module can be connected to an external device using a 9-pin connector that is provided on the Module face.
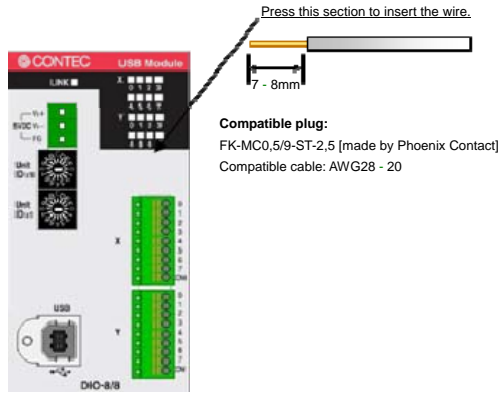
Connection Method

When connecting the Module to an external device, you can use the supplied connector plug.   When wiring the Module, strip off approximately 7 - 8 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 - 20.

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

Press this section to insert the wire.

7 - 8mm

Compatible plug:
FK-MC0,5/9-ST-2,5 [made by Phoenix Contact]
Compatible cable: AWG28 - 20

## External Input and Output Circuit

Input Section
Figure below shows the input equivalent circuit for the interface section.
The signal input section consists of an opto-isolated input (compatible with both current sink output and current source output).   Therefore, driving the input section for the Module requires an external power supply with a minimum capacity of approximately 8mA (or 4mA for 12VDC) per input point for 24VDC.
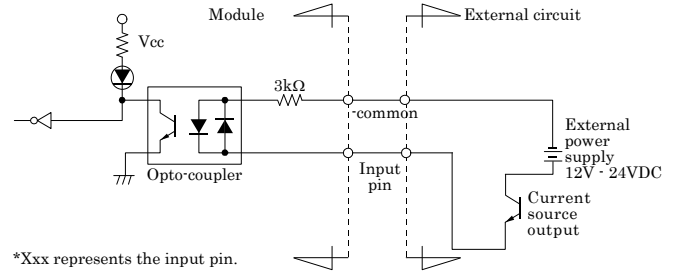
Input Circuit

*Xxx represents the input pin.
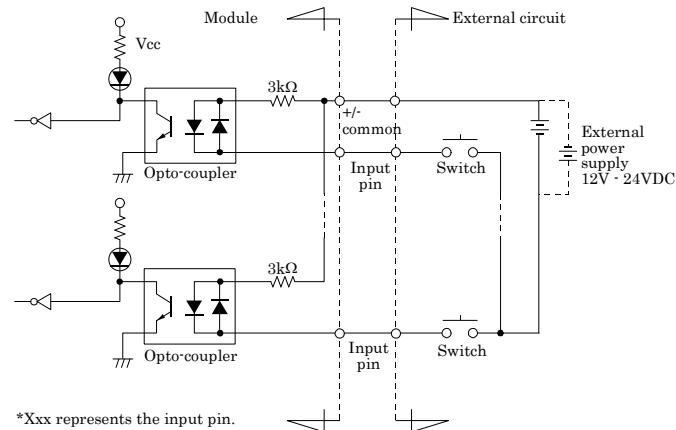
Example of a Connection to Current Sink Output

*Xxx represents the input pin.
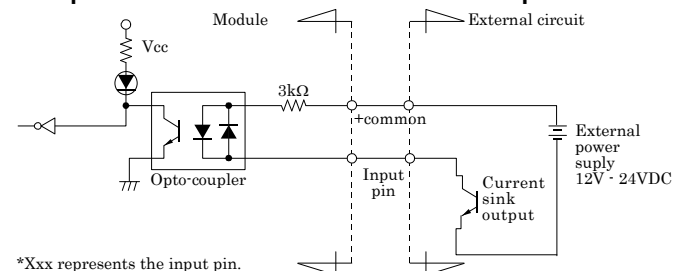
Example of a Connection to Current Source Output

*Xxx represents the input pin.

Output Section
Figure shows the output circuit for the interface section.
The signal output section consists of an opto-isolated open collector method (current sink type).   Therefore, driving the output section for the Module requires an external power supply with a nominal output current of 150mA maximum per point.   A surge voltage protection circuit is not provided on the output transistors.   Therefore, when driving relays, lamps, and other induction loads using this Module, a surge voltage countermeasure should be provided on the load side.

Output Circuit

*Yxx represents the output pin.
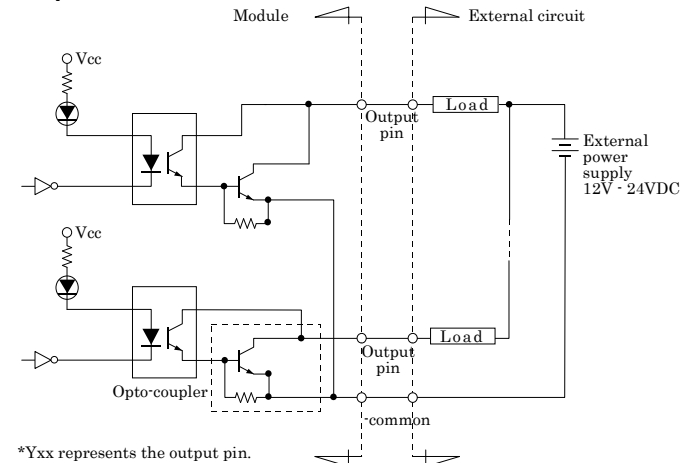
Point
When the power is turned on, all output will be OFF.

Connecting an External Power Supply

The module can be used via only USB cable if it uses bus power.   In this situation, the external power supply is not required.

If you want to control the power consumption of the computer with battery, such as Note PC, you can use self-power to provide power for the module.   In addition, if you use expansion modules, the self-power is required.

When you use self-power, please use +5VDC input terminal.

Vi+ ---- Power supply(5V)
5VDC Vi- ---- Power supply(GND)
FG ---- Frame ground

Input plug is 5VDC ±5% input, Laterally operable screw-in type connector is supplied as a standard item. (MC1,5/3-ST-3,5 Phoenix Contact compatible cable: AWG28 - 16)

To supply power using the bundled connector plug (MC1,5/3-ST-3,5), strip the end of the corresponding cable, insert it into the connector plug, then securely screw the plug.

Use an external power supply (available as an option) depending on the operating environment and application.

Category	Model	Input	Output	External dimensions(mm)	DIN rail
AC adapter	POA200-20	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) x 64.7(D) x 94.0(H) (exclusive of protrusions)	Yes
AC-DC power	POW-AD22GY	85 - 265VAC	5.0VDC ±5% 2.0A (Max.)	52.4(W) x 64.7(D) x 94.0(H) (exclusive of protrusions)	Yes
DC-DC power	POW-DD10GY	10 - 30VDC	5.0VDC ±5% 3.0A (Max.)	25.2(W) x 64.7(D) x 94.0(H) (exclusive of protrusions)	Yes
DC-DC power	POW-DD43GY	30 - 50VDC	5.0VDC ±5% 3.0A (Max.)	25.2(W) x 64.7(D) x 94.0(H) (exclusive of protrusions)	Yes

*   The consumed current of DIO-8/8(USB)GY, DI-16(USB)GY or DO-16(USB)GY is +5VDC 450mA(Max.) individually.
The consumed current of DIO-8/8(FIT)GY, DI-16(FIT)GY or   DO-16(FIT)GY is +5VDC 150mA(Max.) individually.

2 outputs

AC input

MC1,5/3-ST-3,5 (Bundled) *1 (Phoenix Contact)
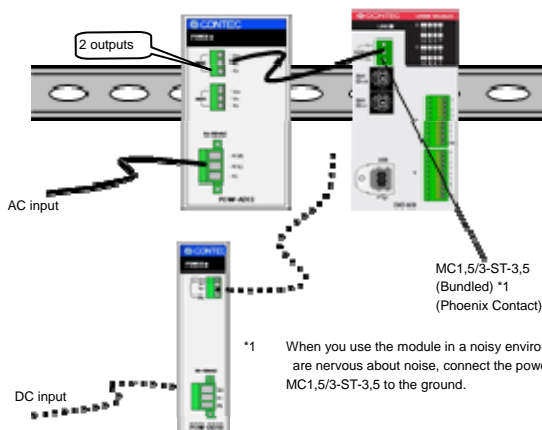
*1   When you use the module in a noisy environment or are nervous about noise, connect the power plug MC1,5/3-ST-3,5 to the ground.

DC input

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 digital I/O point 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 I/O point is considered when designing this module, and additional module can be connected by the connector on the side of the module, so that not only the cost but also the installation space are controlled.

The various modules (Option) are prepared for each USB module.

Model	Input point	Output point	Current consumption	Function
DIO-8/8(FIT)GY	8	8	+5VDC 150mA(Max.)	Expansion module for DIO-8/8(USB)GY
DI-16(FIT)GY	16	None	+5VDC 150mA(Max.)	Expansion module for DI-16(USB)GY
DO-16(FIT)GY	None	16	+5VDC 150mA(Max.)	Expansion module for DO-16(USB)GY

Since the maximum number of modules to be connected is 3, in the case of combination of the USB module "DIO-8/8(USB)GY" and three expansion modules "DIO-8/8(FIT)GY", it is possible to control 32 points input and 32 points output by way of one USB port.
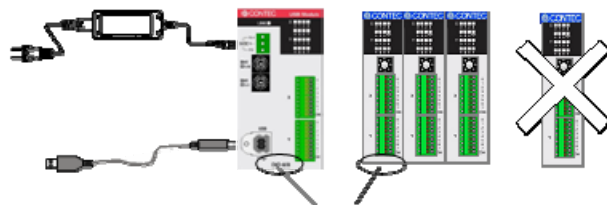
Points

Up to 3 modules can be connected.

You need for external power supply such as AC adapter(Option) when adding modules.

Modules with different function from the USB module can not be connected.   Please use private modules.