F&eIT Series
Isolated Digital I/O Module

DIO-16/16(FIT)GY

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

This product is an expansion module (device module) that adds digital signal I/O interfaces to one of various types of controllers. The product is used in combination with the I/O controller module < CPU-CAxx(FIT)GY > (*1) or BOX-PC < BX-300-DC5xxx > (*1) or microcontroller unit
< CPU-SBxx(FIT)GY > (*1) in the F&eIT Series.
This product can perform a maximum of 16 points of opto-isolated input and 16 points of opto-isolated output per module. (Input: 12 - 24 VDC specified, output: 12 - 48 VDC specified)

*1 This module is available in different product models. "x" in each model number represents a blank or one alphanumeric character. This is applicable to the rest of this document.

* 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 April, 2023.

Features

- A different external power supply can be used for each common pin as it is shared by 16 signal points.
- This product can perform 16-points digital signal input and 16-points digital signal output.
- The output section is a high sink current, open collector type using high-capacitance transistors.
- 150 mA/24 VDC or 50 mA/48 VDC max. (per channel)
- Input section is ready to accept both the current sinking output and current source output.
- Isolated I/O operations using an optocoupler improves noise immunity.
- This product has a digital filter to prevent input signals from carrying noise or a chattering.
- A rotary switch allows you to set device IDs, making it easy to keep track of device numbers.
- Like other F&eIT series products, the module has a 35mm DIN rail mounting mechanism as standard. A connection to a controller module can be effected on a lateral, stack basis in a unique configuration, which permits a simple, smart system configuration without the need for a backplane board.
- You can use all of the input signals as interrupt inputs. You can also select the interrupt trigger edge of the input signal.

Specifications

Function specification

Item		Specifications
Input section		
Input format		Opto-isolated input (compatible with current sink output and current source output)
Input resister		3kΩ
Input ON current		3.4 mA or more
Input OFF current		0.16 mA or less
Number of input signal points		16 points (16 points/common)
Response time		Within 1msec
External circuit power supply		12 - 24 VDC (±15%) (4 mA/12V - 8 mA/24V per channel)
Output section		
Output format		Opto-isolated open collector output (current sink type)
Ratings	Output voltage	12 - 48 VDC (±15%)
	Output current	150 mA (12 - 24V) (per channel) (Max.) 50 mA (36 - 48V) (per channel) (Max.)
Number of output signal points		16 points (16 points/common)
Response time		Within 1msec
External circuit power supply		12 to 48 VDC (±15%)
Common section		
Interrupt level		Using CPU-SBxx(FIT)GY: IRQ 5, 7, or 9
Internal current consumption		5 VDC(±5%) 150 mA(Max.) *1
Allowable distance of signal extension		Approx. 50m (depending on wiring environment)
Physical dimensions (mm)		25.2(W) x 64.7(D) x 94.0(H) (exclusive of protrusions)
Weight of the module itself		100g
Module connection method		Stack connection by means of a connection mechanism standard with the system.
Module installation method		One-touch connection to 35mm DIN rails (standard connection mechanism provided in the system)
Applicable wire		AWG24 - 16
Applicable plug		FMC 1,5/18-ST-3,5(made by Phoenix Contact Corp.)

*1 The stack connector accepts currents of up to 3.0A (Max.).

Installation Environment Requirements

Item		Requirement description
Operating temperature		0 - 50℃
Storage temperature		-10 - 60℃
Operating humidity		10 - 90%RH (No condensation)
Floating dust particles		Not to be excessive
Corrosive gases		None
Noise immunity	Line-noise *1	AC line/2kV, Signal line/1kV (IEC1000-4-4Level 3, EN61000-4-4Level 3)
	Static electricity resistance	Contact discharge/4kV (IEC1000-4-2Level 2, EN61000-4-2Level 2) Atmospheric discharge/8kV (IEC1000-4-2Level 3, EN61000-4-2Level 3)
Vibration resistance	Sweep resistance	10 - 57Hz/semi-amplitude 0.15mm, 57 - 150Hz/2.0G 80minutes each in X, Y, and Z directions (JIS C0040-compliant, IEC68-2-6-compliant)
Impact resistance		15G half-sine shock for 11ms in X, Y, and Z directions (JIS C0041-compliant, IEC68-2-27-compliant)
Standard		VCCI Class A, FCC Class A, CE Marking (EMC Directive Class A, RoHS Directive), UKCA

*1 When using a POW-AD22GY

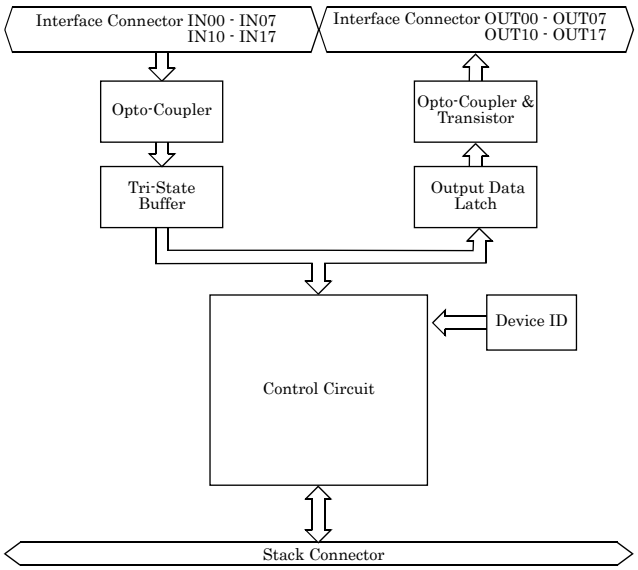
⚠ CAUTION

When connecting one of the modules to a controller module, the internal current consumption should be taken into account. If the total current exceeds the capacity of the power supply unit, the integrity of the operation cannot be guaranteed. For further details, please see the Controller Module manual.

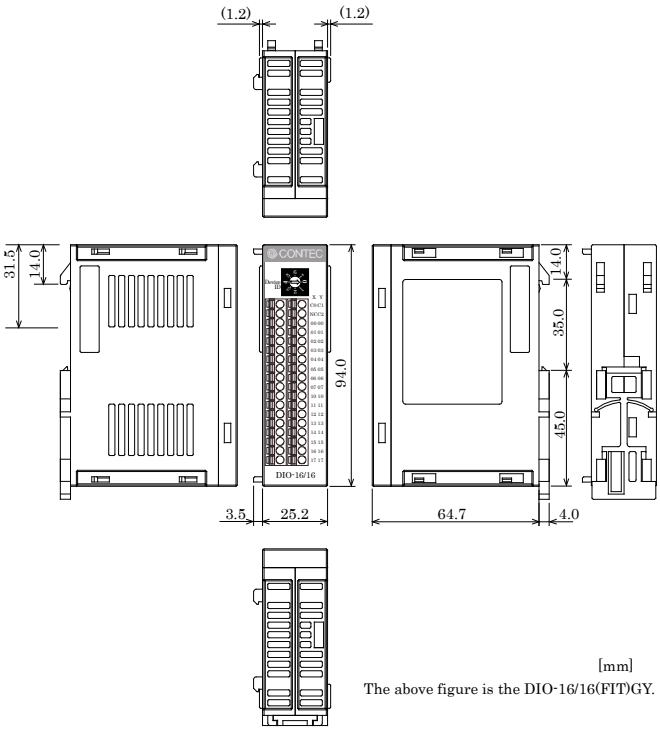
Included Items

Module [DIO-16/16(FIT)GY] ...1
Interface connector plug ...1
Please read the following ... 1

Block Diagram



Physical Dimensions



[mm]
The above figure is the DIO-16/16(FIT)GY.

Functions and control method by controller connected

This product can be connected to a variety of controllers.

Supported controllers

Microcontroller Unit : CPU-SBxx(FIT)GY
I/O Controller Module : CPU-CAxx(FIT)GY
Monitoring & Control Server Unit : SVR-MMF2(FIT)

Check each controller to which the module can be connected as well as the method of controlling the module when connected to that controller.

Connections to controllers

O: Permitted
×: Not permitted

	BX-300-DC5xxx	CPU-SBxx(FIT)GY	CPU-CAxx(FIT)GY	SVR-MMF2(FIT)	SVR-MMF(FIT)GY
DIO-16/16(FIT)GY	O	O	O	O	×
DI-32(FIT)GY	O	O	O	O	×
DO-32(FIT)GY	O	O	O	O	×
Device ID setting range	0 - 7	0 - 7	0 - 7	0 - 7	0 - 7

Control method by controller connected

		BX-300-DC5xxx	CPU-SBxx(FIT)GY	CPU-CAxx(FIT)GY	SVR-MMF2(FIT)	SVR-MMF(FIT)GY
Control using the I/O address map		O	O			
Control using the memory address map				O		
Control via the Windows driver *	FIT Protocol			O		
	API-CAP(W32)			O		
	API-SBP(W32)	O	O			
	API-USBP(WDM)					
Control over the web (as set from within the browser)					O	

* The API-SBP(W32) is visit the CONTEC's Web site.

Control using the I/O address map

When connected to the BX-300-DC5xxx, the CPU-SBxx(FIT)GY, the module can receive I/O instructions directly from the controller module. For details, see Chapter 4 "Using the I/O Address Map".

Control using the memory address map

When connected to the CPU-CAxx(FIT)GY, the module can be accessed from the host computer over the network. The module is assigned with its device ID in the memory managed by the controller module. The application running on the host computer controls the module by reading/writing the memory managed by the controller module.

Control via the Windows driver

For the functions and settings available when using the Windows driver, refer to the reference manual and online help for each module.

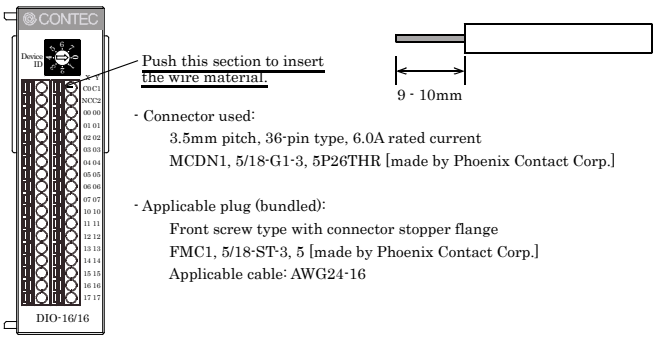
Control over the web – Connecting to the SVR-MMF2(FIT)

You can monitor collected data and manage the log over the web. You can use your familiar browser to easily make various settings. For details, refer to the reference manual for the SVR-MMF2(FIT).

How to Connect an Interface Connector

When connecting the Module to an external device, you can use the supplied connector plug.

When wiring the Module, strip off approximately 9 - 10mm 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 24 - 16.



- Connector used:
  3.5mm pitch, 36-pin type, 6.0A rated current
  MCDN1, 5/18-G1-3, 5P26THR [made by Phoenix Contact Corp.]

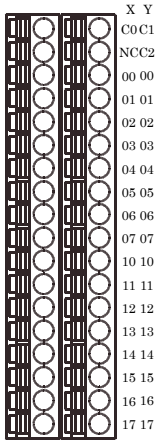
- Applicable plug (bundled):
  Front screw type with connector stopper flange
  FMC1, 5/18-ST-3, 5 [made by Phoenix Contact Corp.]
  Applicable cable: AWG24-16

⚠ CAUTION

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

Signal Layout on the Interface Connector

The Module can be connected to an external device using two 18-pin connectors that is provided on the Module face.



Pin No.	Signal name	Meaning	Pin No.	Signal name	Meaning
X			Y		
C0	COM	Common for Input+0, +1 group	C1	COM(+)	Plus common for Output+0, +1 group
NC	N.C.	Unconnected	C2	COM(-)	Minus common for Output+0, +1 group
00	IN00	Input+0 group	00	OUT00	Output+0 group
01	IN01		01	OUT01	
02	IN02		02	OUT02	
03	IN03		03	OUT03	
04	IN04		04	OUT04	
05	IN05		05	OUT05	
06	IN06		06	OUT06	
07	IN07		07	OUT07	
10	IN10	Input+1 group	10	OUT10	Output+1 group
11	IN11		11	OUT11	
12	IN12		12	OUT12	
13	IN13		13	OUT13	
14	IN14		14	OUT14	
15	IN15		15	OUT15	
16	IN16		16	OUT16	
17	IN17		17	OUT17	

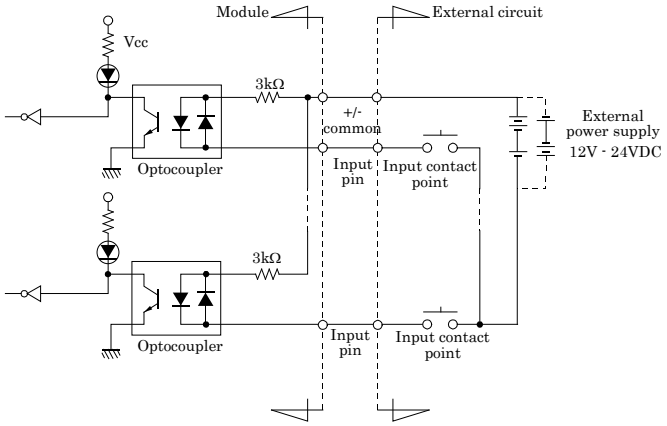
External I/O Circuits

Input section

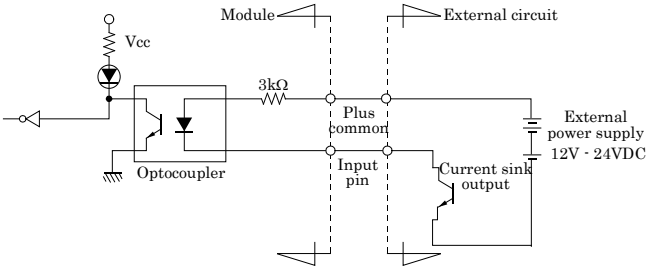
Figure below shows the input equivalent circuit for the interface section of this product.

The signal input section consists of an opto-isolated input (compatible with both current sink output and current source output). An external power supply is therefore required to drive the input section of this module. The power requirement for this product is about 8 mA per input channel at 24 VDC (about 4 mA at 12 VDC).

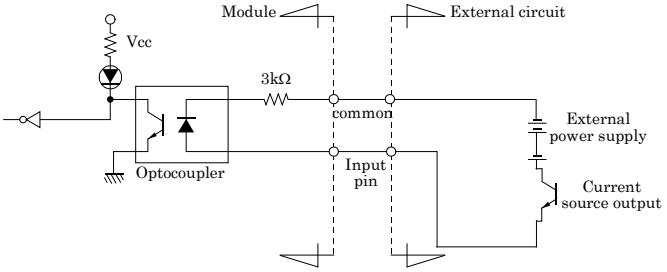
Input Circuit



Example of a Connection to Current Sink Output



Example of a Connection to Current Source Output



Output section

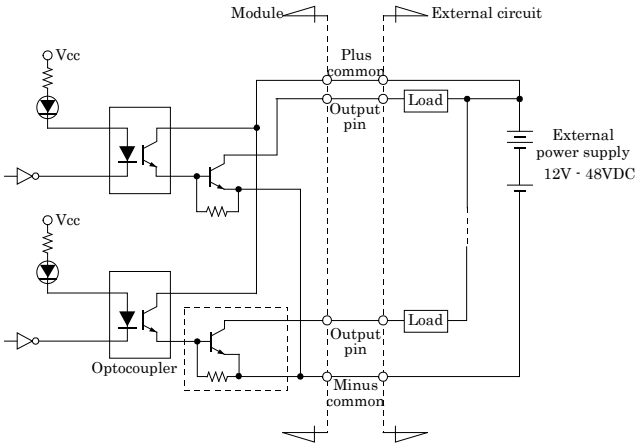
Figure below shows the output circuit for the interface section of this product. The signal output section consists of an opto-isolated open collector output (current sink type). An external power supply is therefore required to drive the output section of this module.

The maximum output current rating per channel is 150 mA for this product (at 12 - 24 VDC) or 50 mA for this product (at 36 - 48 VDC). A surge voltage protection circuit (zener diode) is provided for the output transistors of this module. When the module drives relays, lamps, and other induction loads, however, another surge voltage countermeasure should be provided on the load side.

⚠ CAUTION

When the power is turned on, all output will be OFF.

Output Circuit



Setting a Device ID

The controller module distinguishes and keeps track of the modules that are connected to it by assigning device IDs to them. Each module, therefore, should be assigned a unique ID.
A Device ID can be assigned in a 0 - 7 range, so that a maximum of eight modules can be distinguished.
The factory setting for the Device ID is [0].

Setup Method

A Device ID can be set by turning the rotary switch that is located on the module face.
A Device ID can be assigned by turning the switch.