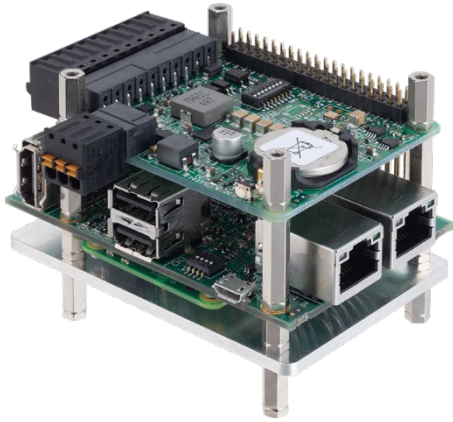


Raspberry Pi Controller CM4 RAM 2GB eMMC 16GB
CODESYS Model

CPI-PS10CM4 Series

Raspberry Pi Controller CM4 RAM 2GB eMMC 16GB

CPI-MS10CM4 Series



Features

- Industrial controller equipped with a Raspberry Pi Compute Module 4

The built-in Raspberry Pi Compute Module 4 makes this product well-suited for use in industrial application fields such as industrial automation and IoT devices.

- Equipped with CODESYS, a software-based PLC

The CPI-PS10CM4 model is equipped with CODESYS, a software-based PLC. CODESYS is a device-independent-PLC-programming system that is compliant with the IEC 61131-3 standard and supports all standard programming languages such as ST or LD.

- RAS functionality for improved reliability, availability, and serviceability

Equipped with a high-output, high-efficiency 5VDC 5A power supply and a noise filter for removing external noise, this product supplies clean power to expansion cards.

To improve availability, the expansion card automatically shuts down and restarts to minimize system downtime if the dedicated software or hardware detects a problem.

The dedicated software also monitors various statuses for improved serviceability.

- Real-time clock (RTC) with temperature compensation

RTCs without temperature compensation will usually be accurate in an environment of about 25°C. In low- or high-temperature environments, however, accuracy is likely to decrease due to the internal crystal characteristics. The RTC internal temperature compensation feature in this product improves the accuracy of time tracking in any temperature environment.

- Support for a wide range of power supplies

This product supports external power supplies ranging from 8 - 28VDC (6 - 30V).

- Timer interrupt for intermittent operation

Setting a start date and time using the RTC makes it possible to start the Raspberry Pi at a specific date and time.

The included low power consumption power supply circuit also minimizes current consumption during shutdown.

- External power supply function

Output connectors are available for outputting 8 - 28VDC power or 5VDC power, allowing external devices to be turned on or off according to the Raspberry Pi operation status.

This product is an industrial controller equipped with a Raspberry Pi Compute Module 4.

It is equipped with one 1000Mbps LAN port, one 100Mbps LAN port, one HDMI port, and two USB ports for flexible installation in addition to advanced environmental resistance. It can also take on additional NVMe storage for stress-free use in practical applications. Furthermore, expansion cards can be connected in a stack to this product's HAT interface for use with systems that require multiple signal inputs and outputs.

The CPI-PS10CM4 model is equipped with CODESYS, a software-based PLC. The CODESYS software can be used to construct and execute original PLC programs. CODESYS is a device-independent PLC-programming system that is compliant with the IEC 61131-3 standard and supports all standard programming languages such as ST or LD.

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

* 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 October, 2024.

- **Adaptable to a wide range of temperature between -20 and +60°C**
The product is capable of operating in the temperature between -20 and + 60°C. It can be installed in the various environments.

Specifications

Function specification < 1 / 2 >

	Item	Description	
CM4 Module	Module	Raspberry Pi Compute Module 4	
	CPU	Broadcom BCM2711 quad-core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5GHz	
	GPU	VideoCore VI® 500MHz	
	Memory	2GB LPDDR4-3200 SDRAM	
	eMMC storage	16GB eMMC Flash (100MB/s)	
Interface	Image output	HDMI1.4×1(Set the resolution to 1920 × 1080 or lower.)	
	USB	USB2.0 Type A×2 USB2.0 Micro-B×1 (used to write the OS)	
	LAN	1000BASE-T/100BASE-TX/10BASE-T×1(built-in CM4 module×1) 100BASE-TX/10BASE-T×1(MICROCHIP LAN9512×1)	
	NVMe	PCIe Gen2 type2242 Key-M	
	LED	Power LED, Status LED, Access LED, Active LED	
	Switch	Power switch, Setting switch	
	Digital input		
		Input type	Non-isolated opto-coupler input (supports current sink output [negative logic] *1)
		Number of input signal channels	2
		Isolation	Non-isolated
		Voltage Resistance	Non-isolated
		Internal power supply	3.3V±5%
		Input Resistance	Current-limiting : 220Ω, Shunt resistance : 1kΩ
		Input ON current	6.4mA (Typ)
		Input OFF current	0.16mA or less
		Input signal voltage	3.3 - 28VDC
	Digital Output		
	Output type	Solid State Relay output	
	Number of output signal channels	1	
	Isolation	Solid State Relay isolation	
	Voltage Resistance	AC1000Vrms	
	Output rating	Output Voltage 28VAC/DC (Max.)	
		Output Current 200mA (Max.)	
	ON resistance	2Ω or less (25°C)	
	OFF leak current	1μA or less (25°C)	
External power supply output			
	8 - 28VDC power supply output	Max. 2A (Output voltage varies according to DC power supply input voltage)	
	5VDC power supply output	< No additional expansion card, 5VDC bus partial power output 0A, USB device 1.0A supply, SSD installed > 5V±5% 500mA (Max.) *2	
DIO Connector		2 pieces 3.81mm pitch 10-pin terminal	

Item		Description
Compatible DIO connector wire		AWG26 - 16
Bus specification	Power supply output	< No additional expansion card, 5VDC bus partial power output 0A, USB device 1.0A supply, SSD installed > 5V±5% 500mA (Max) *2 3.3V±5% 500mA (Max)
	I2C bus (I2C1)	Used for 0x2c address and 0x32 address
Interrupt notification	Function	Open collector output (Pull-up: 15kΩ)
	Notification destination	Select from GPIO 4, 5, 6, or 22 (using DIP switch)
Power supply	Rated input voltage	8 - 28VDC
	Input voltage range	6 - 30VDC
	Consumption power *3	<8V to 28V and with an external power supply output of 0A> 8VDC 4.0A (Max) 28VDC 1.1A (Max)
	Connector	2 pieces 3.5mm pitch 3-pin terminal (V+, V-, FG)
	Applicable wire	AWG22 - 16
Physical dimensions (mm)		82.9(W)×56.5(D)×61.7(H)
Weight		200g (approx)

- *1 Data "0" and "1" correspond to the High and Low levels, respectively.
- *2 The power supply output value should be such that the total power consumption value is less than the available power supply value. For details, refer to "About current consumption of Expansion Cards and External Power Contribution".
- *3 The product is equipped with a fuse (rated current: 5A) for preventing overcurrent in the power supply input. Use a power supply that has overcurrent protection or that has a current capacity capable of blowing the fuse (9.5A or more is recommended). When using a power supply of 17V or less, the current value of the power input section should be 4A or less.

Environment Requirements

Item		Description
Operating Temperature *4		-20 - +50°C (no airflow), -20 - +60°C (airflow 0.7m/s)
Storage Temperature		-20 - +60°C
Humidity		10 - 90%RH (No condensation)
Floating dust particles		Not to be excessive
Corrosive gases		None
Line-noise resistance *5	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) Indirect discharge /±4kV (IEC61000-4-2 Level 2, EN61000-4-2 Level 2)
		Sweep resistance
Shock resistance		15G half-sine shock for 11ms in X, Y, and Z directions (JIS C 60068-2-27-compliant, IEC 60068-2-27-compliant)
Standard		VCCI Class A, FCC Class A, CE Marking (EMC Directive Class A, RoHS Directive), UKCA

- *4 The 5V output current may be limited depending on the ambient temperature. Refer to the derating graph and make sure the current does not exceed the limit.
- *5 When using an optional power supply: 10 - 55Hz (For details, refer to the optional power supply manual)

About current consumption of Expansion Cards and External Power Contribution

The current consumption of this product varies depending on the expansion cards being added, and the external power supply output power consumption. Current consumption of individual expansion card is listed below.

When connecting expansion cards and when generating an external power supply output of 5V, ensure that the power is within the contributable range.

This Product	Current Consumption [W] *
CPI-PS10CM4-2E021, CPI-MS10CM4-2E021	11W * With a USB device at 1.0A
CPI-PS10CM4-2E021, CPI-MS10CM4-2E021	3W * With a USB device at 1.0A, with SSD installed

Expansion card	Current Consumption [W] *
CPI-DI-16L	0.2W
CPI-DO-16L	0.6W
CPI-DO-16RL	0.6W
CPI-DIO-0808L	0.4W
CPI-DIO-0808RL	0.4W
CPI-RRY-16	0.7W
CPI-AI-1208LI	1.4W
CPI-AO-1602LC	2.3W

Expansion card	Current Consumption [W] *
CPI-CNT-3201I	0.6W

External Power Contribution	Current Consumption [W] *
5VDC power supply output	10W(5V 1.8A)
5V bus section power supply output	10W(5V 1.8A)

* This includes conversion loss when voltage is converted using the product.

An example)

When connecting four CPI-DI-16L expansion cards to a CPI-PS10CM4-2E021 with no SSD installed, the maximum power with a 5V external power supply output of 1A becomes the following:
0.2 [W] × 4 + 5.6 [W] = 6.4 [W], which is within the contributable power range.

Selecting the Power Supply

Use a power supply that meets the total power consumption required by the combination of this product and all the eExpansion cards. Since the power input section is equipped with a fuse with a current rating of 5A to prevent overcurrent, the current value of the power input section should be 4A or less when using a power supply of 17V or less.

This Product	Current Consumption [W] *
CPI-PS10CM4-2E021, CPI-MS10CM4-2E021	17W * With a USB device at 1.0A
CPI-PS10CM4-2E021, CPI-MS10CM4-2E021	25W * With a USB device at 1.0A, with SSD installed

Expansion card	Current Consumption [W] *
CPI-DI-16L	0.2W
CPI-DO-16L	0.6W
CPI-DO-16RL	0.6W
CPI-DIO-0808L	0.4W
CPI-DIO-0808RL	0.4W
CPI-RRY-16	0.7W
CPI-AI-1208LI	1.4W
CPI-AO-1602LC	2.3W
CPI-CNT-3201I	0.6W

External Power Contribution	Current Consumption [W] *
8 - 28VDC power supply output	38W (19V 2A) at 19V input, 48W (24V 2A) at 24V input
5VDC power supply output	10W(5V 1.8A)
5V bus section power supply output	10W(5V 1.8A)

* This includes conversion loss when voltage is converted using the product.

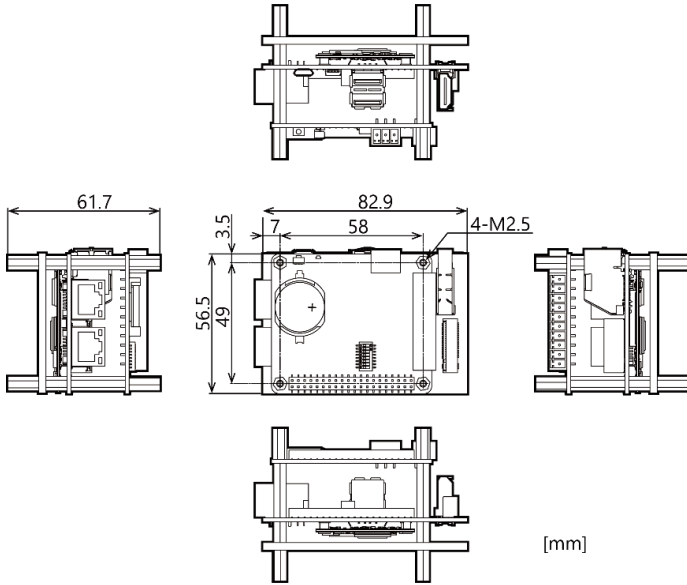
An example)

When connecting one CPI-DI-16L expansion card to a CPI-PS10CM4-2E021 with no SSD installed, the maximum power with a 5V external power supply output of 0.25A becomes the following:
17 [W] + 0.2 [W] × 1 + 1.4 [W] = 18.6 [W]
When the optional power supply [PWA-65AWD9 (19V 65W)] is used, the current value of the power supply input section is 18.6[W] ÷ 19[V] = 1.0[A], which satisfies the required power consumption and is below the maximum current value (4A) of the power supply input section.

CAUTION

Select a power supply that has a sufficient margin to cover the required power consumption.

Physical Dimensions



Included Items

Name	CPI-PS10CM4-xxxxx	CPI-MS10CM4-xxxxx
	Pcs.	
The Main Body	1	1
Three-point Sems Screws(M2.5x6)	4	4
Three-point Sems Screws(M3x6)	1	1
10-pin Connector	1	1
3-pin Connector	1	1
CODESYS License Activation Code	1	0
Product Guide	1	1

* This product is verified in conformity with our recommended power supply. In case you use other power supplies, thus, it may not be able to fulfil certification requirements. Please see the Contec website regarding power supply recommendation (<https://www.contec.com/>).

* When using CODESYS with the CPI-PS10CM4 Series, you have to activate the license by using the CODESYS license activation code included with the product. Download the "Reference Manual (CODESYS)" from the following URL and activate the license.

Download <https://www.contec.com/download/>

Optional Products

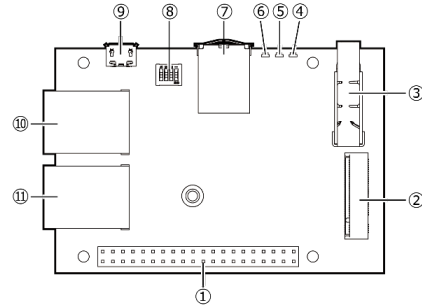
Product Name	Model type	Description
AC adapter	PWA-65AWD9	Switching AC adapter 65W (Input: 100 - 240VAC, Output: 19VDC 3.42A)
DIN rail fitting power supply	CPS-PWD-30AW24-01	Fitting power supply 30W (Input: 100 - 240VAC, Output: 24VDC 1.3A)
	CPS-PWD-90AW24-01	Fitting power supply 90W (Input: 100 - 240VAC, Output: 24VDC 3.8A)
Din Rail Adapter	CPI-DIN01	This product is a mount kit for mounting on a 35mm DIN rail.
Expansion Card	CPI-DI-16L	Isolated Digital Input (Input 16 points, supporting sink/source output)
	CPI-DO-16L	Isolated Digital Output (Output 16 points, sink output)
	CPI-DO-16RL	Isolated Digital Output (Output 16 points, source output)
	CPI-DIO-0808L	Isolated Digital Input/Output (Input 8 points, Output 8 points, sink output)
	CPI-DIO-0808RL	Isolated Digital Input/Output (Input 8 points, Output 8 points, source output)
	CPI-RRY-16	Solid State Relay Output (Output 16 points)
	CPI-AI-1208LI	Isolated Analog Input (12-bit analog input 8 ch, differential 4 ch)
	CPI-AO-1602LC	Isolated analog output (16-bit analog output 2 ch, Voltage output/Current output)
	CPI-CNT-3201I	Isolated counter (32-bit up/down counter 1 ch)

Product Lineup

Model	Compute Module	Wireless	CODESYS
CPI-PS10CM4-2E021	CM4002016 (RAM2GB, ROM16GB)	None	CODESYS Control Standard S
CPI-MS10CM4-2E021			None

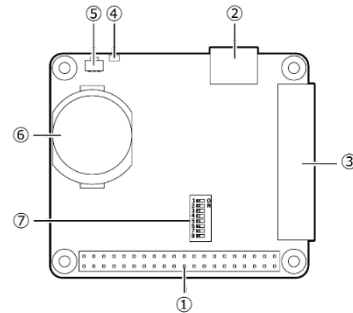
Component Name

Lower board



No.	Name	Function
1	GPIO 40-pin Connector	This connector is used to expand the number of expansion cards.
2	M.2 NVMe SSD Connector	This is a PCIe Gen2 Type2242 NVMe SSD connector.
3	HDMI	This is a display (19-pin receptacle)
4	Power LED	This LED indicates the ON/OFF status of the power supply.
5	Active LED	This LED indicates the status of Compute Module 4 activity.
6	Access LED	This LED indicates the status of the SSD.
7	USB 2.0 Port	This is a USB 2.0 port of type-A.
8	DIP Switch	These switches are used for settings.
9	Micro USB	This is a USB 2.0 Micro-B connector. It is used to write the OS.
10	LAN Port	This is a connector for LAN. (100/10Mbps)
11	LAN Port	This is a connector for LAN. (1000/100/10Mbps)

Upper board



No.	Name	Function
1	GPIO 40-pin Connector	This connector is used to expand the number of expansion cards.
2	DC Power Connector	This connector is used for power input. It uses the included 3-pin connector.
3	DIO Connector	This connector is used for power supply output and digital input/output. It uses the included 10-pin connector.
4	Status LED	This indicator is used to display the operation status of the product.
5	Power Switch	This switch is used to turn on/off the product.
6	RTC Battery	This is the primary RTC battery connector. The connector accepts a CR2032 battery.
7	DIP Switch	This switch sets the GPIO pins to use for outputting the interrupt notification signal.

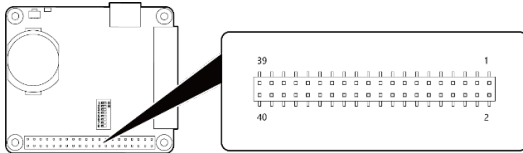
Description of Product Components

GPIO 40 pin Connector

This connector is used to connect to an expansion card. The system can be expanded up to a maximum of eight expansion cards.

CAUTION

- When adding expansion cards, make sure that the total power consumption value is less than the supplyable power value. For details, refer to "About current consumption of Expansion Cards and External Power Contribution".
- This product uses devices with I2C addresses 0x2C and 0x32. It is not possible to extend I2C devices that conflict with these.



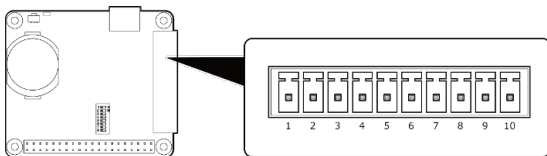
Pin Assignment

Pin No.	Signal Name	Description	Pin No.	Signal Name	Description
1	3.3V Power	3.3V±5% power output	2	5V Power	5V±5% power output
3	GPIO 2(I2C1 SDA)	I2C1 SDA	4	5V Power	5V±5% power output
5	GPIO 3(I2C1 SCL)	I2C1 SCL	6	Ground	GND
7	GPIO 4	INT_1	8	GPIO 14(UART TX)	(Don't use)
9	Ground	GND	10	GPIO 15(UART RX)	(Don't use)
11	GPIO 17	(Don't use)	12	GPIO 18(PCM CLK)	(Don't use)
13	GPIO 27	(Don't use)	14	Ground	GND
15	GPIO 22	INT_2	16	GPIO 23	(Don't use)
17	3.3V Power	3.3V±5% power output	18	GPIO 24	(Don't use)
19	GPIO 10(SPI0 MOSI)	(Don't use)	20	Ground	GND
21	GPIO 9(SPI0 MISO)	(Don't use)	22	GPIO 25	(Don't use)
23	GPIO 11(SPI0 SCLK)	(Don't use)	24	GPIO 8(SPI0 CE0)	(Don't use)
25	Ground	GND	26	GPIO 7(SPI0 CE1)	(Don't use)
27	GPIO 0(EEPROM SDA)	(Don't use)	28	GPIO 1(EEPROM SCL)	(Don't use)
29	GPIO 5	INT_3	30	Ground	GND
31	GPIO 6	INT_4	32	GPIO 12(PWM0)	(Don't use)
33	GPIO 13(PWM1)	(Don't use)	34	Ground	GND
35	GPIO 19(PCM FS)	(Don't use)	36	GPIO 16	(Don't use)
37	GPIO 26	(Don't use)	38	GPIO 20(PCM DIN)	(Don't use)
39	Ground	GND	40	GPIO 21(PCM DOUT)	(Don't use)

DIO Connector

The interface connector includes an external power supply output, two digital inputs, and one digital output. It uses the included 10-pin connector.

Applicable connector type: DEGSON 15EDGKD-3.81-10P-13-00A(H)
PHOENIX CONTACT FK-MCP 1.5/10-ST-3.81 (or equivalent)



Pin Assignment

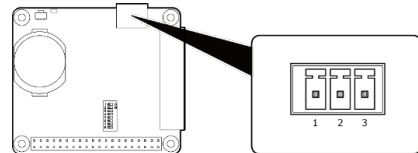
Pin No.	Signal Name	Description
1	DO-	This indicates the output signals. This contact is connected to the negative (-) side of the input signals of other devices.
2	DO+	This indicates the output signals. This contact is connected to the positive (+) side of the input signals of other devices.
3	DI1-	This indicates the input signals. This contact is connected to the negative (-) side of the output signals of other devices.
4	DI1+	This indicates the input signals. This contact is connected to the positive (+) side of the output signals of other devices.
5	DI0-	This indicates the input signals. This contact is connected to the negative (-) side of the output signals of other devices.
6	DI0+	This indicates the input signals. This contact is connected to the positive (+) side of the output signals of other devices.
7	5V external power supply -	This contact outputs voltage at 5V ±5% on the software setting. (Power ON : 0V)
8	5V external power supply +	This contact outputs voltage at 5V ±5% on the software setting. (Power ON : 0V)

Pin No.	Signal Name	Description
9	8 - 28V external power supply -	This contact outputs the input voltage from the DC power supply connector on the software setting. (Power ON : 0V)
10	8 - 28V external power supply +	This contact outputs the input voltage from the DC power supply connector on the software setting. (Power ON : 0V)

DC power connector

The included 3-pin power connector is used for connecting an external power supply.

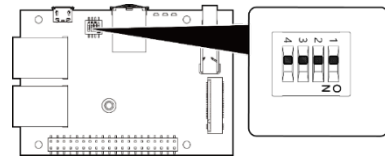
Applicable connector type: DEGSON 15EDGKD-3.5-03P-13-00A(H)
PHOENIX CONTACT FK-MCP1,5/3-ST-3,5 (or equivalent)



Pin No.	Signal Name	Description
1	FG	Frame ground
2	V-	GND
3	V+	8 - 28VDC

DIP switch (Lower board)

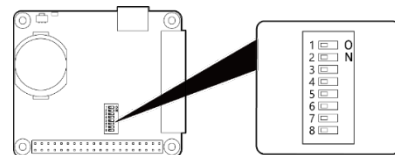
Use these switches when writing the OS.



Bit No.	ON/OFF	Description
1		Reserved for system; Leave to OFF.
2		Reserved for system; Leave to OFF.
3	ON	Set to ON when writing the OS.
	OFF	Set to OFF during normal operation.
4		Reserved for system; Leave to OFF.

DIP Switch (Upper board)

Use these switches when setting the GPIO pins to which to output the interrupt notification signal.



Pin No.	Signal Name	Operation	Description
1	INT_1	OFF	Interrupt notification signal not connected to GPIO4 (Pin 7) (Factory setting)
		ON	Interrupt notification signal connected to GPIO4 (Pin 7)
2	INT_2	OFF	Interrupt notification signal not connected to GPIO22 (Pin 15) (Factory setting)
		ON	Interrupt notification signal connected to GPIO22 (Pin 15)
3	INT_3	OFF	Interrupt notification signal not connected to GPIO5 (Pin 29) (Factory setting)
		ON	Interrupt notification signal connected to GPIO5 (Pin 29)
4	INT_4	OFF	Interrupt notification signal not connected to GPIO6 (Pin 31)
		ON	Interrupt notification signal connected to GPIO6 (Pin 31)
5	Reserved	OFF	Reserved for system; Leave to OFF.
6	Reserved	OFF	Reserved for system; Leave to OFF.
7	Reserved	OFF	Reserved for system; Leave to OFF.
8	Reserved	OFF	Reserved for system; Leave to OFF.

CAUTION

Turn the product off before changing the setting switches.

Connecting to an External Device

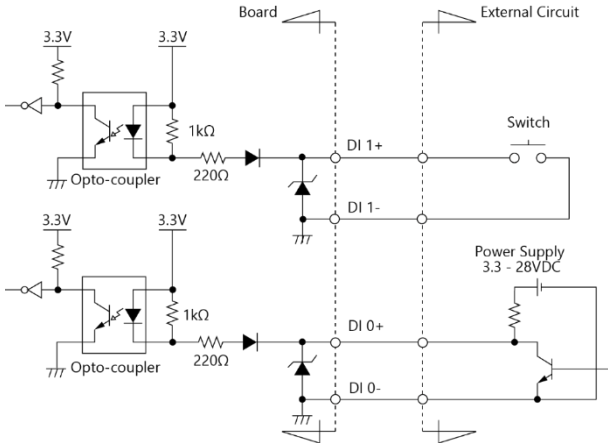
Digital Input

The equivalent circuit of the digital input interface part is shown in the following figure.

The digital input is connected to a device that can perform current driving such as a switch or transistor output device. The ON/OFF state of the device is input as a digital value.

The signal input is a non-isolated opto-coupler input. The digital input supports current sink output.

Digital input circuit



The signal input is a non-isolated opto-coupler input (with current sink output support). A current of 6.4mA is required to turn the input on, and a leakage current of 0.16mA or less is required to turn the input off.

Digital Output

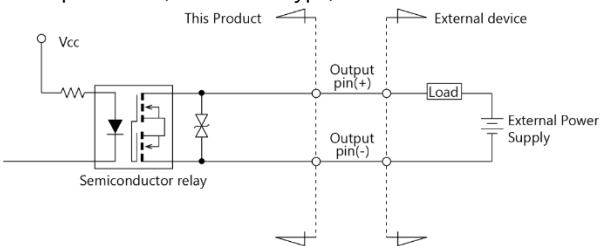
The equivalent circuit of the digital output interface part is shown in the following figure.

Connect the digital output to a device that is driven by current, such as a relay or an LED. For the connection to the expansion card, an external power supply is required in order to supply the current.

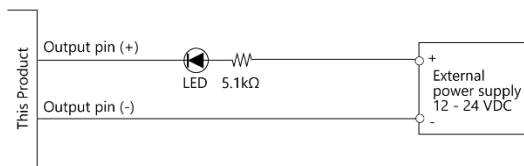
The turning ON/OFF of the expansion card that is driven by current is controlled with a digital value.

The maximum rated output current is 200 mA per channel.

Digital Output circuit (Current sink type)



Example of connecting the product to LED

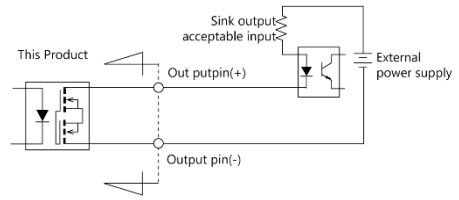


The corresponding LED will be lit up when you output "1" into the appropriate bit.

The corresponding LED will be turned off when you output "0" into the appropriate bit.

Example of connecting the product to other devices

- Connecting an output to a sink output-acceptable input



- Connecting an output to a source output-acceptable input

