BOX Computer
BX-M210 Series (GPIO Model)

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

This product is a fan-less computer for embedded applications with an Intel Atom processor x5-E3940 (1.6GHz). It provides an ultra-compact design with a capability of operating in a wide temperature range (between -20 and + 60℃ in an airflow environment of 0.7m/s). Addition to DisplayPort, a wide variety of interfaces including USB3.2 Gen1 (USB3.0) x 4, LAN x 2, Digital I/O (32 isolated inputs, 32 isolated outputs), RS-232C/422/485 are provided. Furthermore, the product types with wireless LAN function and Bluetooth are ready for connecting digital devices with ease, and they are ideal as IoT gateway terminals that can link to peripheral devices.

Embedded-type CPU has been adopted. The use of readily available parts ensures the product to be applied easily. In addition, CONTEC-customized BIOS allows support to be provided at the BIOS level.

*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 July, 2022.

Features

Ultra-compact design about as large as A5 size contributes to space-saving
With a space-saving design of a thickness of 55 mm, a width of 182 mm, and a depth of 155 mm that is about A5 size.

Operation capable in a wide temperature range between -20 and +60℃
Achieves stable operation in a wide temperature range of -20 to +60℃ *1

"Power failure protection system" features power-off without OS shutdown
Equipped with the "Power failure protection system" function that protects data and prohibits writing to storage in the event of power failure. Along with the lockdown (disk writing suppression) function of Windows IoT Enterprise, power can be safely turned off without a shutdown process. Moreover, file system damage or data damage caused by sudden power failure can be avoided.

Built-in digital input and output functions
The product is equipped with functions equivalent to CONTEC's DIO-3232L-PE interface card, enabling support for 32 opto-coupler isolated inputs and outputs in addition to interrupt, digital filtering, and output transistor protection circuits (surge voltage and overcurrent protection). As with other CONTEC interface cards, the product also supports DAQfast for LabVIEW, a data recording library for use with LabVIEW.

High-security design contributes to a highly reliable system
The latest security functions such as TPM2.0 and Secure Boot, as well as CONTEC's original functions including the USB Boot Protect are provided. This product is designed with the high security required for industrial applications in mind.

CONTEC-customized BIOS provides useful utility
Useful utility of BIOS*2 customized by CONTEC is provided. The "CONTEC Fast Boot" achieves Windows startup in 10 seconds.*3

The "Disk Copy" function provides secure disk backup at the BIOS level, and also supports backup in file format or compressed file format. We also offer the CONTEC tools "BIOS update tool" for updating BIOS.*4

Helps reduce running costs and energy consumption
This product uses the x5-E3940 low power consumption Intel Atom processor platform to achieve low power consumption while still providing sufficient performance.

Fan-less design reduces maintenance work
The product is fan-less to ensure a totally spindle-less design that simplifies maintenance, relieving the concern about dust or foreign matter to get into the product. Moreover, along with minimized use of degrading parts greatly reduce maintenance work.

Rich interfaces for easy connection to various peripherals
In addition to DisplayPort x1, USB3.2 Gen1 (USB3.0) x 4, USB2.0 x 4, and LAN x 2, Analog RGB port, RS-232C x 4 (three ports can be used as RS-422 or 485), isolated digital input 32ch and isolated digital output 32ch are equipped. The CFast card slot, which is easily replaceable, is used for storage and can be used as a writing area for logs and collected data. The wireless type (BX-M210-J2303, BX-M210-J2313) can be connected to wireless LAN and Bluetooth compatible devices.

*1   In an airflow environment of 0.7m/s
*2   For details, see each setting in the [BIOS Setup] section.
*3   It is the actual measured value when Windows 10 and HORM function are enabled at the factory. Time may vary depending on configuration. Note that TXE, TPM, Network Stack, and SMART Self Test are not supported when the CONTEC Fast Boot is enabled.
*4   Contact your retailer for more information.

Supported OS

Windows 10 IoT Enterprise 2019 LTSC 64bit (Japanese / English / Chinese / Korean)

Packing List

Name		BX-M210-J2301 [Base Type] Pcs.	BX-M210-J2311 [OS Pre-install Type] Pcs.	BX-M210-J2303 [Wireless Type] Pcs.	BX-M210-J2313 [OS Pre-install, Wireless Type] Pcs.
Product		1	1	1	1
The Attachment Fitting		2	2	2	2
Cable Tie for Cable		1	1	1	1
Washer Assembled Screw (M3x6, Black)		4	4	4	4
Washer Assembled Screw for Attachment (M4x10, Black)		4	4	4	4
Power Supply Connector Complete Set	Power Connector	1	1	1	1
	Contact	4	4	4	4
Antenna		-	-	2	2
Product Guide		1	1	1	1

Specifications

Function specification

Item		Description
CPU		Intel Atom® x5-E3940 Processor 1.6GHz
BIOS		BIOS (mfd. by AMI)
Memory		8GB (204-pin SO-DIMM), PC3L-12800 (DDR3L-1600) ECC
Graphics Controller		Intel® HD Graphics 500 (CPU integrated)
System Resolution	DisplayPort	800 x 600, 1,024 x 768, 1,152 x 864, 1,280 x 600, 1,280 x 720, 1,280 x 768, 1,280 x 800, 1,280 x 960, 1,280 x 1,024, 1,360 x 768, 1,366 x 768, 1,400 x 1,050, 1,440 x 900, 1,600 x 900, 1,600 x 1,200, 1,680 x 1,050, 1,792 x 1,344, 1,856 x 1,392, 1,920 x 1,080, 1,920 x 1,200, 1,920 x 1,440, 1,920 x 2,160, 2,048 x 1,152, 2,048 x 1,536, 2,560 x 1,080, 2,560 x 1,440, 2,560 x 1,600, 2,560 x 1,920, 2,560 x 2,048, 3,840 x 2,160 (1,6770,000 colors)
	Analog RGB	800 x 600, 1,024 x 768, 1,152 x 864, 1,280 x 600, 1,280 x 720, 1,280 x 768, 1,280 x 800, 1,280 x 960, 1,280 x 1,024, 1,360 x 768, 1,366 x 768, 1,400 x 1,050, 1,440 x 900, 1,600 x 900, 1,600 x 1,200, 1,680 x 1,050, 1,920 x 1,080, 1,920 x 1,200 (1,6770,000 colors)
Audio		Conforms to HD Audio, LINE OUT x1, MIC IN x1
M.2 Card Slot		1 slot, M.2 2242 Key M, SATAIII M.2 built-in SSD (TLC, 128GB, 1 partition) *1
		1 slot, M.2 2230/2280, Key E, PCIe(x1) 1 port, USB2.0 1 port BX-M210-J23x3 : M.2 Wireless LAN card built-in
CFast Card Slot		1 slot, CFast CARD Type I, bootable
LAN		Intel® I210IT controller 1000BASE-T/100BASE-TX/10BASE-T x 2 ports RJ-45 connector (supports Wake On LAN)
USB		USB 3.2 Gen1 (USB3.0) compliant 4ports USB 2.0 compliant 4ports
Serial		RS-232C/422/485 3ports, RS-232C 1port Baud rate: 50 - 115,200bps
Wireless LAN *3		IEEE 802.11ac/a/b/g/n
Bluetooth *3		4.2
General Purpose I/O (Non-isolated)		I/O 6 channels, switch signal
General Purpose I/O(Isolated)		
Input		
	Input format	Opto-coupler isolated input (Compatible with current sink output) (Negative logic *5)
	Number of input signal channels	32ch (32ch available for interrupts) (1 common in 16ch)
	Input resistance	4.7kΩ
	Input ON current	2.0mA or more
	Input OFF current	0.16mA or less
	Interrupt	32 interrupt input signals are arranged into a single output of interrupt signal INTA. An interrupt is generated at the rising edge (HIGH-to-LOW transition) or falling edge (LOW-to-HIGH transition).
	Response time	Within 200μsec
Output		
	Output format	Opto-coupler isolated open collector output (current sink type) (Negative logic *5)
	Number of output signal channels	32ch (1 common in 16ch)
	Output rating — Output voltage	35VDC (Max.)
	Output rating — Output current	100mA (par channel) (Max.)
	Residual voltage with output on	0.5V or less (Output current≤50mA), 1.0V or less (Output current≤100mA)
	Surge protector	Zener diode RD47FM(NEC) or equivalent to it
	Response time	Within 200μsec
Common		
	Built-in power	None
	Allowable distance of signal extension	Approx. 50m (depending on wiring environment)
	I/O address	Any 32-byte boundary
	Interruption level	1 level use
	Isolated Power	1000Vrms
	External circuit power supply	12 - 24VDC (±10%)
Security (TPM)		TCG TPM2.0
Hardware monitoring		Monitoring CPU temperature, card temperature, and power voltage
Watchdog timer (WDT)		Software programmable, 255 level (1sec - 255sec),

Item		Description
		Time up allows reset
Real Time Clock		Lithium backup battery life: 10 years or more *2 The real-time clock is accurate within ±3 minutes (at 25℃) per month (CPU integrated RTC).
Power Management		Power management setup via BIOS Power On by Ring/Wake On LAN Supports ACPI Power management
Interface	Display	DisplayPort (v1.2) x 1 Analog RGB x 1
	Audio	LINE OUT: 3.5φ Stereo mini jack MIC IN: 3.5φ Stereo mini jack
	M.2 Card Slot	1 slot, M.2 2242, Key M 1 slot, M.2 2230/2280, Key E
	CFast Card Slot	1 slot, CFast CARD Type I
	LAN	2-port (RJ-45 connector)
	USB	USB3.2 Gen1 (USB3.0) compliant 4ports (TYPE-A connector) USB2.0 compliant 4ports (TYPE-A connector)
	RS-232C/ 422/485	3 ports (9pin D-SUB connector [Male])
	RS-232C	1 port (9pin D-SUB connector [Male])
	DIO	1 port (9pin D-SUB connector [Female])
	DI	37 pin D-SUB connector [Female] DCLC-J37SAF-20L9E [mfd by JAE] or equivalent to it
	DO	37 pin D-SUB connector [Female] DCLC-J37SAF-20L9E [mfd by JAE] or equivalent to it
Power supply	Rated Voltage Range	12 - 24VDC ±10% *4
	Input Voltage Range	10.8 - 31.2VDC
	Current Consumption (Max.)	12V 4.2A, 24V 2.2A
	External Device Power Supply Capacity	M.2 slot Key M : +3.3V : 2.5A (2,500mAx1) M.2 slot Key E : +3.3V : 2.0A (2,000mAx1) CFast card slot : +3.3V 0.5A (500mAx1) USB3.2 Gen1 (USB3.0) I/F : +5V : 3.6A (900mAx4 per port) USB2.0 I/F : +5V : 2.0A (500mAx4 per port)
Physical dimensions (mm)		182(W) x 155(D) x 55(H) (Not including the attachment fitting or protrusions)
Weight		1.8kg (approx.) (Not including the attachment fitting)

*1　The capacity of disk in the OS pre-installed type is a value when 1GB is calculated by 1 billion bytes. The capacity that can be recognized from OS might be displayed fewer than an actual value.
*2　It is when temperature is 25℃ and the power is disconnected for 16 hours a day.
*3　Wireless LAN and Bluetooth are only available on wireless types.
*4　Use a power cable 3 meters or shorter.
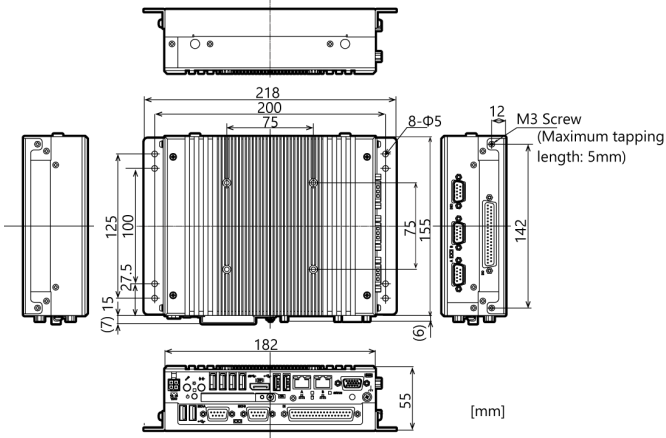*5　Data "0" and "1" correspond to the High and Low levels, respectively.

Installation Environment Requirements

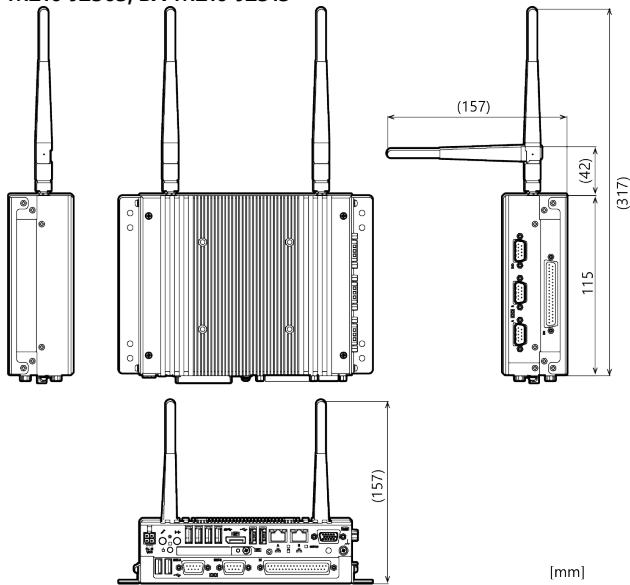| Item		Description
Operating temperature *6		-20 - +50℃ no airflow -20 - +60℃ airflow 0.7m/s
Storage Temperature *6		-20 - +70℃
Humidity		10 - 90%RH (No condensation)
Floating dust particles		Not to be excessive
Corrosive gases		None
Line-noise resistance	Line noise	AC Line/±2kV *7, Signal Line/±1kV (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 vibration 0.15mm, 57 - 150Hz/2.0G 40minutes each in X, Y, and Z directions (JIS C60068-2-6-compliant, IEC60068-2-6-compliant)
Impact resistance		10G half-sine shock for 11ms in X, Y, and Z directions (JIS C 60068-2-27-compliant, IEC 60068-2-27-compliant)
Grounding		Class D grounding, SG-FG / continuity
Standard		VCCI Class A, FCC Class A, CE Marking (EMC Directive Class A, RoHS Directive) *8, UKCA *8, TELEC (set with the certified wireless module) *9

*6　The ambient temperature should be 0℃ and higher when using or storing the audio.
*7　It is when the product is used with AC adapter PWA-65AWD1.
*8　The wireless type is excluded from CE and UKCA Standard.
*9　The wireless module is set only in the wireless type.

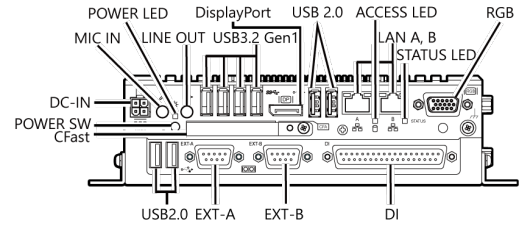## External Dimensions

BX-M210-J2301, BX-M210-J2311

218
200
75
8-Φ5
12
M3 Screw
(Maximum tapping length: 5mm)
125
100
75
155
142
27.5
(7) 15
(6)
182
55
[mm]

BX-M210-J2303, BX-M210-J2313

(157)
(42)
(317)
115
(157)
[mm]

List of Option

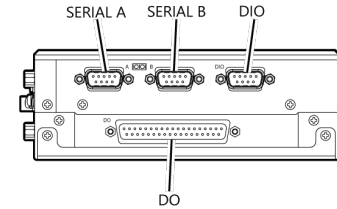| Item	Model	Description
AC adapter	PWA-65AWD1	Switching AC adapter 12VDC 5.417A
Storage	CFS-4GB-A	4GB SATA CFast card (SLC)
	CFS-8GB-A	8GB SATA CFast card (SLC)
	CFS-16GB-A	16GB SATA CFast card (SLC)
	CFS-32GBM2-A	32GB SATA CFast card (MLC)
	CFS-16GBQ-A	16GB SATA CFast card (Q-MLC)
	CFS-32GBQ-B	32GB SATA CFast card (Q-MLC) (Wide temperature range specification)
Antenna extension cable	IPC-RPSMA-2	RP-SMA connector coaxial cable
DIO Cable (Two connectors, Flat)	PCB37P-1.5	Two 37-pin D-SUB Flat 1.5m
DIO Cable (Two connectors, Shielded)	PCB37PS-0.5P	Two 37-pin D-SUB Shielded 0.5m
	PCB37PS-1.5P	Two 37-pin D-SUB Shielded 1.5m
	PCB37PS-3P	Two 37-pin D-SUB Shielded 3m
	PCB37PS-5P	Two 37-pin D-SUB Shielded 5m
DIO Cable (One connector, Flat)	PCA37P-1.5	One 37-pin D-SUB Flat 1.5m
	PCA37P-3	One 37-pin D-SUB Flat 3m
DIO Cable (One connector, Shielded)	PCA37PS-0.5P	One 37-pin D-SUB Shielded 0.5m
	PCA37PS-1.5P	One 37-pin D-SUB Shielded 1.5m
	PCA37PS-3P	One 37-pin D-SUB Shielded 3m
	PCA37PS-5P	One 37-pin D-SUB Shielded 5m
Signal monitor	CM-32L	Signal monitor Accessory for Digital I/O

* 　　Information about the option products, see the Contec's website.
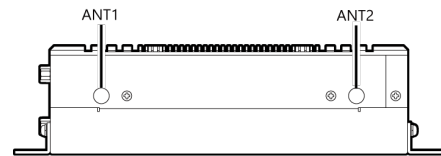
Component Name

Front

POWER LED
DisplayPort
USB 2.0
ACCESS LED
RGB
MIC IN
LINE OUT
USB3.2 Gen1
LAN A, B
STATUS LED
DC-IN
POWER SW
CFast
USB2.0 EXT-A EXT-B DI

Side

SERIAL A SERIAL B DIO
DO

Rear

ANT1　　　　　　　　ANT2

Name	Function
Front	
DC-IN	DC power connector
POWER LED	Power ON display LED
ACCESS LED	SATA device access display LED
STATUS LED	Status LED
POWER SW	PC power switch
MIC IN	Mike in (3.5φ PHONE JACK)
LINE OUT	Line out (3.5φPHONE JACK)
USB 3.2 Gen1	USB 3.2 Gen1 (USB3.0) port connector x4
USB 2.0	USB 2.0 port connector x4
CFast	CFast card slot (SATA connection)
DisplayPort	Display (20-pin female)
LAN A	Ethernet 1000BASE-T/100BASE-TX/10BASE-T RJ-45 connector
LAN B	Ethernet 1000BASE-T/100BASE-TX/10BASE-T RJ-45 connector
RGB	Display (15-pin D-SUB, female)
EXT-A	Extended Serial port A connector (9-pin D-SUB, male) (RS-232C/422/485)
EXT-B	Extended Serial port B connector (9-pin D-SUB, male) (RS-232C/422/485)
DI	Isolated Digital Input connector (37-pin D-SUB, male)
Side	
SERIAL A	Serial port A connector (9-pin D-SUB, male) (RS-232C/422/485)
SERIAL B	Serial port B connector (9-pin D-SUB, male) (RS-232C)
DIO	GPIO port connector (9-pin D-sub male)
DO	Isolated Digital Output connector (37-pin D-SUB, male)
Rear	
ANT1	Antenna connector (for both wireless LAN and Bluetooth) * 1
ANT2	Antenna connector (for wireless LAN) * 1

*1 Antenna connectors are available only on the wireless type.

Model Name

Model	Wireless	OS	Storage device
BX-M210-J2301	None	None	M.2 SSD 128GB(TLC)
BX-M210-J2311		Windows 10 IoT Enterprise 2019 LTSC 64bit (Japanese / English / Chinese / Korean)	
BX-M210-J2303	IEEE 802.11ac/a/b/g/n Bluetooth 4.2	None	
BX-M210-J2313		Windows 10 IoT Enterprise 2019 LTSC 64bit (Japanese / English / Chinese / Korean)	

Connecting Input Signals

Connect the input signals to a device which can be current-driven, such as a switch or transistor output device.
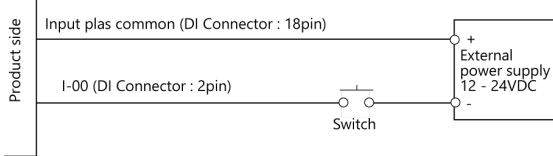The connection requires an external power supply to feed currents.
The product inputs the ON/OFF state of the current-driven device as a digital value.

Input Circuit

* I-xx represents the input pin.
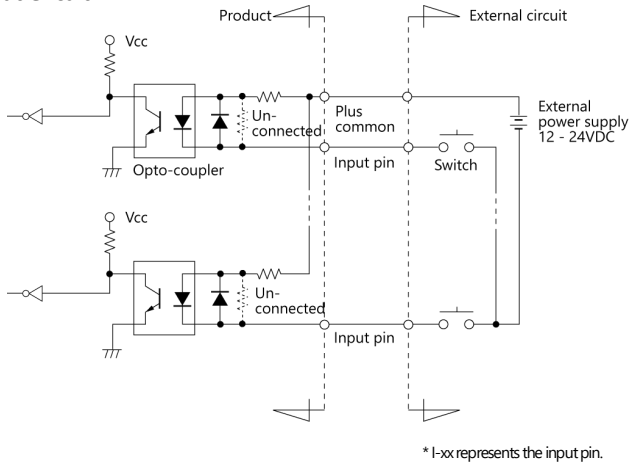
The signal inputs are isolated by opto-couplers (ready to accept current sinking output signals). The card therefore requires an external power supply to drive the inputs. The power requirement for each input pin is about 5.1mA at 24VDC (about 2.6mA at 12VDC).

Connecting a Switch

When the switch is ON, the corresponding bit contains 1.
When the switch is OFF, by contrast, the bit contains 0.

Connecting Output Signals

Connect the output signals to a current-driven controlled device such as a relay or LED.
The connection requires an external power supply to feed currents.
The product controls turning on/off the current-driven controlled device using a digital value.

Output Circuit

* O-xx represents the output pin.
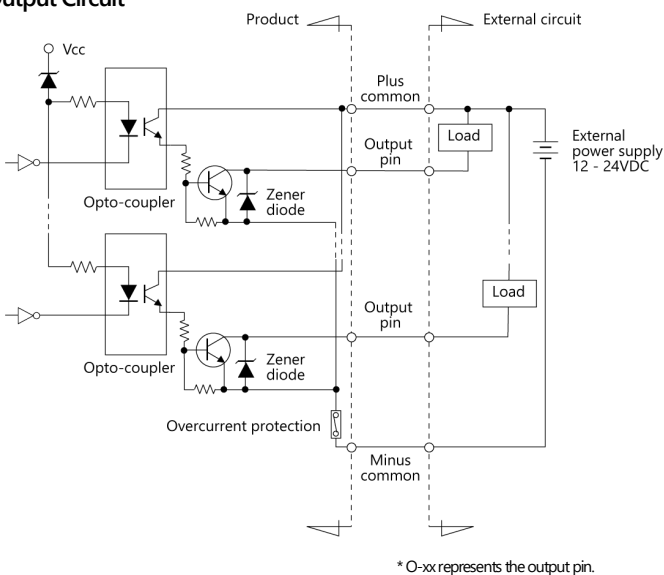
The signal output section is an opto-coupler isolated, open-collector output (current sink type).   Driving the output section requires an external power supply.
The rated output current per channel is 100mA at maximum.
The output section can also be connected to a TTL level input as it uses a low-saturated transistor for output.   The residual voltage (low-level voltage) between the collector and emitter with the output on is 0.5V or less at an output current within 50mA or at most 1.0V at an output current within 100mA.
A zener diode is connected to the output transistor for protection from surge voltages.   A overcurrent protection circuit is provided for every 8 output transistors.

▼CAUTION

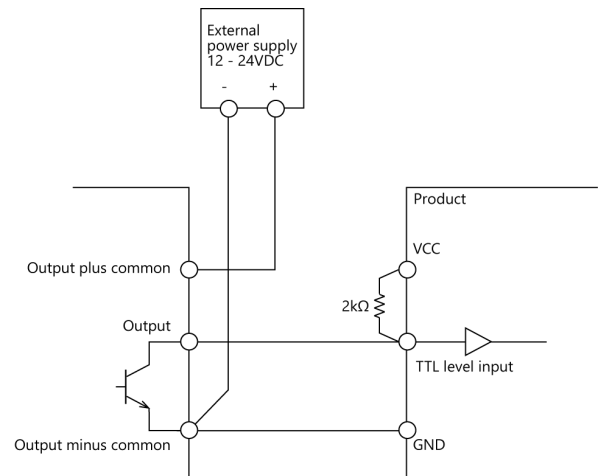When the PC is turned on, all output are reset to OFF.

Connection to the LED
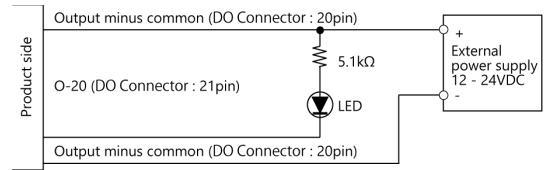
When "1" is output to a relevant bit, the corresponding LED comes on.
When "0" is output to the bit, in contrast, the LED goes out.

When "1" is output to a relevant bit, the corresponding LED comes on.
When "0" is output to the bit, in contrast, the LED goes out.

Example of Connection to TTL Level Input

Connecting the Sink Type Output and Sink Output Support Input

The following example shows a connection between a sink type output (output card) and a sink output support input (input card).   Refer to this connection example when you connect this product to such cards.
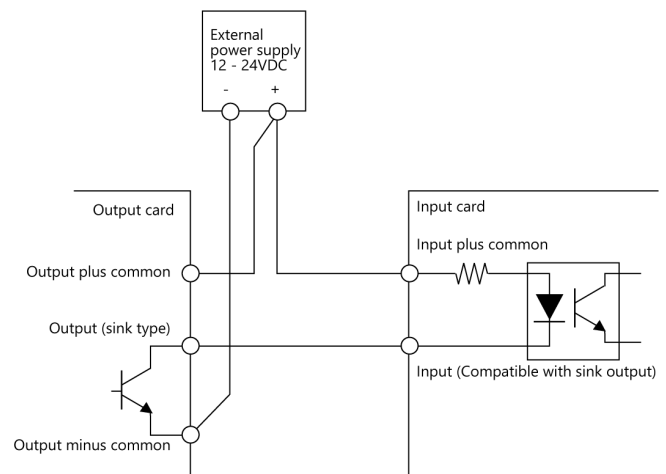
Support Software

This product has digital input/output functions equivalent to our interface card [DIO-3232L-PE].

You can use CONTEC support software according to your purpose and development environment.

For more details on the supported OS, applicable languages, or to download the latest version of software, visit the CONTEC Web site.

Name	Contents	How to get
Driver software API-DIO(WDM)	The API-DIO(WDM) is the Windows version driver software that provides products in the form of Win32 API functions (DLL). Various sample programs such as Visual Basic and Visual C++, etc and diagnostic program useful for checking operation is provided.	Download from the CONTEC website
LabVIEW Data Acquisition Library DAQfast for LabVIEW	DAQfast for LabVIEW (hereinafter referred to as DAQfast) is a free LabVIEW compatible data acquisition library for use with National Instruments LabVIEW. We adopted Polymorphic VI and designed it so that LabVIEW users operate easily without any discomfort. Easy, quickly realize customer's 'I want to do'.	Download from the CONTEC website

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