

4ch 24Bit Up/Down Counter Board for PCI CNT24-4(PCI)H



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

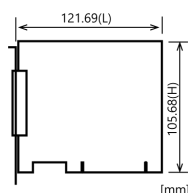
Features

It is equipped with four channels of 24-bit up/down counters. 24-bit up/down count for 4 channels can be performed with one board. The board can count two-phase signals, which can be outputs of some rotary encoders and linear scales. Two-phase signals such as rotary encoders and linear gauges can be counted. You can select either a opto-coupler isolated input or a TTL-level input for each channel by software command. Either differential input or TTL level input can be selected for each channel individually. Each channel can generate an interrupt request signal and a one-pulse output signal when the count data matches a pre-specified value. An interrupt can be generated or a signal can be output externally by matching the count value of each channel with an arbitrarily set value. The board is equipped with a programmable timer to allow interrupts to be generated periodically according to a specified timer value. It has a programmable timer, it is possible to generate interrupts at regular intervals with a set timer value. Each Channel is equipped with a general-purpose input signal (both opto-coupler and TTL-level). Equipped with one general-purpose input signal for each channel. (both opto-coupler and TTL-level).

Included Items

Product [CNT24-4(PCI)H] ...1
Please read the following ... 1

Physical Dimensions



The standard outside dimension (L) is the distance from the end of the board to the outer surface of the slot cover.

This product is a PCI bus-compliant interface board that counts input pulse signals from external devices.

This product has four channels of 24-bit up/down counters, allowing external devices such as a rotary encoder and a linear scale to be connected.

Given below are examples of using the board for "detecting a position of the table of a machine tool" and "detecting a change in weight".

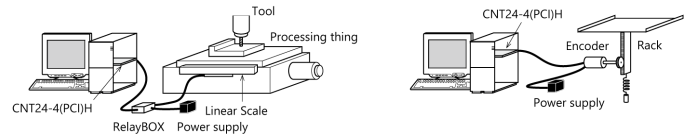
The pulse signal inputting interface is opto-coupler isolated or TTL-level input.

Windows/Linux device driver is supported with this product.

< Example >

- Detecting a position of the table of a machine tool

- Detecting a change in weight



* 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, 2024.

Specifications

Function specification

Item	Specifications
Counter Input	
Number of Channels	4 Channels
Count system	Up/down counting
Max. count	FFFFFFH (binary data)
Counter input type	Opto-coupler isolated input or TTL-level input
Counter input signal	Phase-A/UP 1 x 4 channels Phase-B/DOWN 1 x 4 channels Phase-Z/CLR 1 x 4 channels General-purpose input 1 x 4 channels
Input register	220Ω (photo coupler insulation) or more, 1TTL loading (TTL-level)
Input protection circuit	None
Response frequency	Opto-coupler isolated input 500kHz duty 50% (Max.) TTL-level input *1 1MHz duty 50% (Max.)
Interrupt level	One interrupt caused upon channel count match or timer time-out
External power	5V - 12VDC ±10% Min. 400mA (Required for photo coupler isolated input)
Opto-coupler input current	Opto-coupler primary current 15 - 25mA
Digital filter	0.1μsec - 1056.1μsec (can be independently set for each channel.)
Timer	1msec - 200sec
Match signal output	
Output point	1 x 4 channels
Output type	Photo coupler isolated open collector output
Output rating	35VDC, 50mA (Max.) (per 1 point)
Output signal width	0 - 104.45msec (All channels)
Output protection circuit	None
External power	5V - 12VDC ±10%
Common	
I/O address	8 bits x 32 ports boundary
Power consumption	5VDC 250mA (Max.)
PCI bus specification	32bit, 33MHz, Universal key shapes supported *2
Dimension (mm)	121.69(L) x 105.68(H) *3
Weight	130g

*1 Please use the shielded cable to meet "CE EMC Directive" and "KC EMC".

*2 This board requires power supply at +5V from an expansion slot (it does not work on a machine with a +3.3V power supply alone).

*3 The size of board No.7293, No.7293A, and No.7293B is 176.41 (L) x 105.68 (H) mm.

Installation Environment Requirements

Item	Specifications
Operating ambient temperature	0 - 50°C
Operating ambient humidity	10 - 90%RH (No condensation)
Floating dust particles	Not to be excessive
Corrosive gases	None
Standard	VCCI Class A, CE Marking (EMC Directive Class A, RoHS Directive), UKCA, KC

Support Software

Name	Contents	How to get
Windows Version Counter Driver software API-CNT(WDM)	The Windows device driver is provided as a form of Windows API functions. Various sample programs such as C# and Visual Basic .NET, Visual C++, Python etc. and diagnostic program useful for checking operation is provided.	Download from the CONTEC website *1
Linux Version Counter Driver software API-CNT(LNX)	The Linux device driver is provided as a shared library. The software includes various sample programs such as gcc (C, C++) and Python programs, as well as a configuration tool to configure the device settings.	Download from the CONTEC website *1
Software Development Tool Kits (SDK) and Support Software	In addition to the device drivers, we offer many software programs for using CONTEC devices in an easier manner.	Download from the CONTEC website *2

*1 Download the files from the following URL.

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

*2 For supported software, search the CONTEC website for this product and view the product page.

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

Optional Products

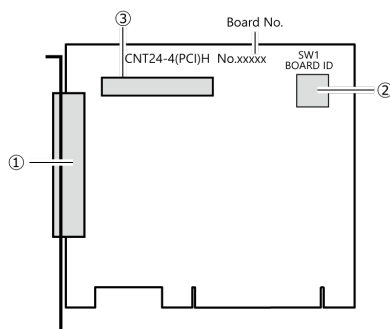
Product Name	Model type	Description
Shield Cable with two 37-pin D-type connectors	PCB37PS-0.5P	0.5m
	PCB37PS-1.5P	1.5m
	PCB37PS-3P	3m
	PCB37PS-5P	5m
	PCB37P-1.5	1.5m
Flat Cable with 37-Pin D-type Connectors on 2Ends	PCA37PS-0.5P	0.5m
Shield Cable with One 37pin D-type Connector	PCA37PS-1.5P	1.5m
	PCA37PS-3P	3m
	PCA37PS-5P	5m
	PCA37P-1.5	1.5m
Flat Cable with a 37Pin D-type Connectors	PCA37P-3	3m
	PCA37P-1.5	1.5m
Flat Type Conversion Cable (30 Pin Header to 37 D-SUB) with Bracket	DT/B2	0.5m
Screw Terminal (M3 * 37P)	EPD-37A	*1 *2
Screw Terminal (M3.5 * 37)	EPD-37	*1
Screw Terminal	DTP-4C	*1

*1 PCB37P or PCB37PS optional cable is required separately.

*2 "Spring-up" type terminal is used to prevent terminal screws from falling off.

Visit the CONTEC website for the latest optional products.

Nomenclature of Product Components



No.	Name	No.	Name
1	Interface Connector (CN1)	3	Interface connector for TTL level input (CN2)
2	Board ID Setting Switch (SW1)		

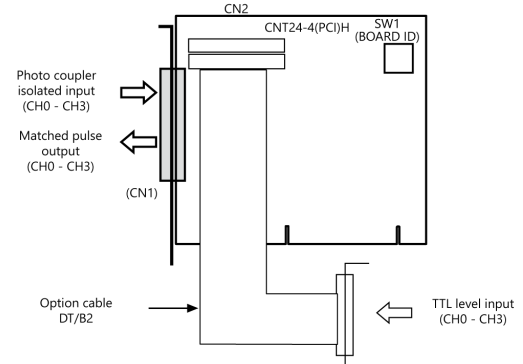
Connecting to an External Device

Connecting an Interface Connector

To input external pulse signals, use the interface connector on the board. Use CN1 for the opto-coupler isolated input.

For TTL level input, connect CN2 to an external device by connecting the optional cable CN2.

Matched pulse output is output from CN1. (Opto-coupler isolated open collector output).



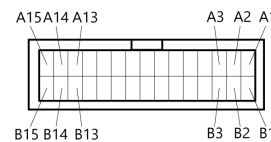
Signal Layout of CNT24-4(PCI)H Interface Connector

Layout on the Interface Connector for the opto-coupler isolated input (CN1)

Channel	Signal	Pin	Signal	Pin	Signal	Pin
CH3	Plus Common	P3P	37	19	N.C.	Not Connected
	General-purpose Input	P3U	36	18	P1P	Plus Common
	Phase-Z / CLR	P3Z	35	17	P1U	General-purpose Input
	Phase-B / DOWN	P3B	34	16	P1Z	Phase-Z / CLR
	Phase-A / UP	P3A	33	15	P1B	Phase-B / DOWN
CH2	Not Connected	N.C.	32	14	P1A	Phase-A / UP
	General-purpose Input	P2U	31	13	N.C.	Not Connected
	Phase-Z / CLR	P2Z	30	12	P0U	General-purpose Input
	Phase-B / DOWN	P2B	29	11	P0Z	Phase-Z / CLR
	Phase-A / UP	P2A	28	10	P0B	Phase-B / DOWN
CH1	Plus Common	P2P	27	9	P0A	Phase-A / UP
	Not Connected	N.C.	26	8	P0P	Plus Common
	Minus Common	OUTN	25	7	N.C.	Not Connected
	CH3 Output	OUT3	24	6	N.C.	Not Connected
	CH2 Output	OUT2	23	5	N.C.	Not Connected
Count-equal matched pulse output	CH1 Output	OUT1	22	4	N.C.	Not Connected
	CH0 Output	OUT0	21	3	N.C.	Not Connected
	Plus Common	OUTP	20	2	N.C.	Not Connected
				1	N.C.	Not Connected

Each channel has an independent plus common. (Same for match output)

Interface connector for the TTL-level input(CN2)



- Connector used
PS-30PE-D4T1PN1 (made by JAE) or equivalent
- Applicable connector
PS-30SEN-D4P1-1C (made by JAE)

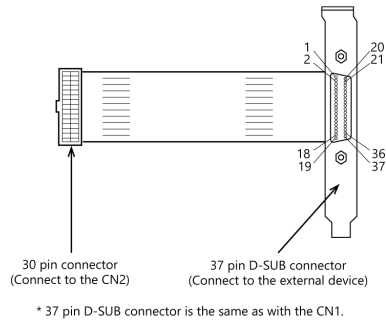
Channel	Signal	Pin	Signal	Pin	Signal	Pin
CH1	Not Connected	N.C.	A1	B1	T0A	Phase-A / UP
	General-purpose Input	T1U	A2	B2	N.C.	Not Connected
	Phase-Z / CLR	T1Z	A3	B3	GND*1	Ground
	Phase-B / DOWN	T1B	A4	B4	GND*1	Ground
	Phase-A / UP	T1A	A5	B5	GND*1	Ground
CH0	Ground	GND*1	A6	B6	GND*1	Ground
	General-purpose Input	T0U	A7	B7	GND*1	Ground
	Phase-Z / CLR	T0Z	A8	B8	GND*1	Ground
	Phase-B / DOWN	T0B	A9	B9	GND*1	Ground
	Not Connected	N.C.	A10	B10	T3A	Phase-A / UP
CH3	General-purpose Input	T3U	A11	B11	GND*1	Ground
	Phase-Z / CLR	T3Z	A12	B12	T2U	General-purpose Input
	Phase-B / DOWN	T3B	A13	B13	T2Z	Phase-Z / CLR
	Phase-A / UP	T2A	A14	B14	T2B	Phase-B / DOWN
	+5V *2	Vcc*1	A15	B15	Vcc*1	+5V *2

*1: The VCC and GND signals are all common.

*2: Outputs +5V power supplied from the +5V pin in the PC to the external device.

The maximum current flowing through these two Vcc pins together is 500mA. Use this pin to supply +5V power to an external device (such as an encoder) for simple checking.

Optional Cable DT/B2



Pin Assignments of an optional cable 37-Pin D-SUB

	GND *1	1		20	Vcc *1	+5V *2	
	GND *1	2		21	Vcc *1	+5V *2	
	GND *1	3		22	N.C.		
	GND *1	4		23	N.C.		
	GND *1	5		24	N.C.		
	GND *1	6		25	N.C.		
	GND *1	7		26	N.C.		
	GND *1	8		27	N.C.		
	Not Connected	N.C.		28	T2A	Phase-A / UP	
	Phase-A / UP	T0A	9	29	T2B	Phase-B / DOWN	
	Phase-B / DOWN	T0B	10	30	T2Z	Phase-Z / CLR	
	Phase-Z / CLR	T0Z	11	31	T2U	General-purpose Input	
	General-purpose Input	T0U	12	32	GND *1	Ground	
	Ground	GND	13	33	T3A	Phase-A / UP	
	Phase-A / UP	T1A	14	34	T3B	Phase-B / DOWN	
	Phase-B / DOWN	T1B	15	35	T3Z	Phase-Z / CLR	
	Phase-Z / CLR	T1Z	16	36	T3U	General-purpose Input	
	General-purpose Input	T1U	17	37	N.C.	Not Connected	
	Not Connected	N.C.	18				
	Not Connected	N.C.	19				

- *1 The VCC and GND signals are all common.
The maximum current flowing through these two Vcc pins together is 500mA.
- *2 Outputs +5V power supplied from the +5V pin in the PC to the external device.
Use this pin as +5V power supply to an external device (such as an encoder) for simple checking.

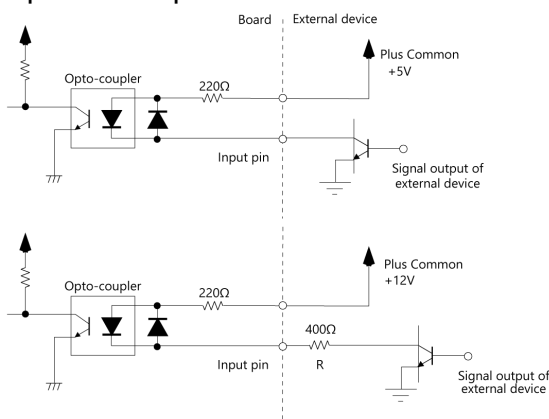
Connection Method to the External device -Differential Input-

Opto-coupler isolated Input

Opto-coupler isolated input connection with a rotary encoder or a linear scale open collector output circuit is shown in the Figure. The maximum input frequency is 500KHz.

For a two-phase input, connect both phase A and phase B. For a single phase input, connect to either phase A or phase B. If not using the Z phase, this does not need to be connected.

Opto-coupler Isolated Input Circuit



CAUTION

- The general input signal uses the same circuit structure.
- To use external power (other than 5V); insert a current limiting resistor at the R position.
The following expression is used to calculate current limiting resistance R with the external power supply as PV:

$$\frac{P-5}{20} < Rk\Omega < \frac{P-5}{15}$$

If P=12, use a 350Ω < R < 470Ω resistor.

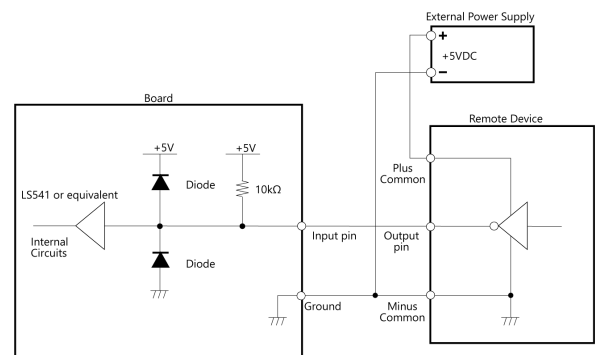
Connection Method to the External device -TTL-Level Input-

TTL-Level Input Connection

Use the TTL-Level Input for the connection with a rotary encoder or a linear scale TTL-level output circuit. The maximum input frequency is 1MHz.

For a two-phase input, connect both phase A and phase B. For a single phase input, connect to either phase A or phase B. If not using the phase Z, this does not need to be connected.

TTL-Level Input Circuit



CAUTION

- The general input signal uses the same circuit structure.
- The connection cable length should be within 1.5 m.
- To prevent malfunction caused by noise, separate the circuit as much as possible from other signal cables and noise sources.
- Please use the shielded cable to meet "CE EMC Directive" and "KC EMC"

One-shot Pulse Output Connection

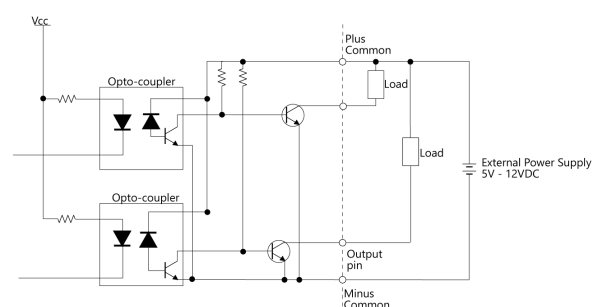
One-shot Pulse Output Connection

When the count value of each channel and the user set value match, the circuit outputs a matched signal for one shot (1 pulse). The signal output part uses the open collector method by opto-coupler insulation. As a result, an external power supply is needed to run the board output.

For pulse wide settings, refer to "One-shot Pulse" of reference manual.

Output Circuit and an Example Connection

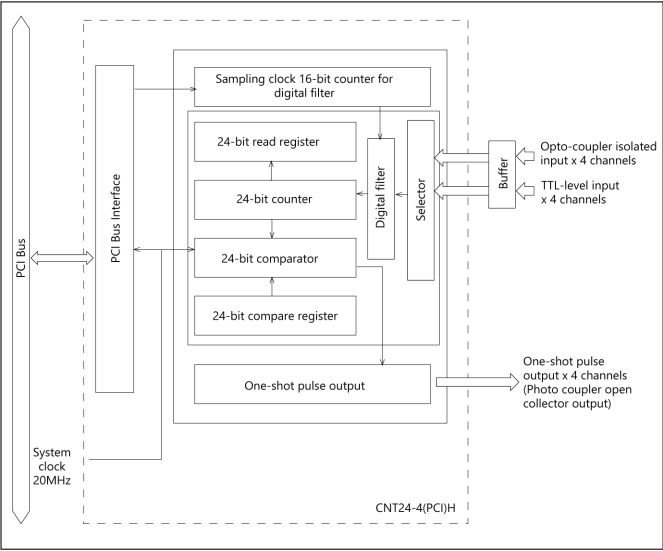
When the count value of a channel matches a preset compare value, the transistor of an output circuit turns on only the time of the preset pulse width.



CAUTION

The output of this board has no surge voltage protector. To drive an inductive load such as a relay or lamp using this board, apply surge voltage protection to the load side. For surge voltage protection, see "Surge Voltage Countermeasures" in the next section.

Circuit Block Diagram



Differences from Conventional Products

Differences between the CNT24-4(PCI)H and CNT24-4(PCI)

The CNT24-4(PCI)H partially enhanced version of the conventional products of CNT24-4(PCI) and it is upper compatible with CNT24-4(PCI). There are some differences in specifications as shown below.

	CNT24-4(PCI)	CNT24-4(PCI)H Board No.7293, 7293A, 7293B	CNT24-4(PCI)H Board No.7293C later
Interrupt signal resource setting	Set to select whether to use jumper JP1	Automatically set by PC	
I/O address	8 bits x 4 ports boundary	8 bits x 32 ports boundary	
Power consumption	5VDC 400mA (Max.)	5VDC 250mA (Max.)	
PCI bus specification	32bit, 33MHz, 5V	32bit, 33MHz, Universal key shapes supported (Supply 5V to the 5V pin)	
Dimension (mm)	176.41(L) x 106.68(H)	176.41(L) x 105.68(H)	121.69(L) x 105.68(H)