

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.

The board can count two-phase signals, which can be outputs of some rotary encoders and linear scales

You can select either a photo coupler isolated input or a TTL-level input for each channel by software command.

Each channel can generate an interrupt request signal and a one-pulse output signal when the count data matches a pre-specified value.

The board is equipped with a programmable timer to allow interrupts to be generated periodically according to a specified timer value.

Each Channel is equipped with a general-purpose input signal (both photo coupler and TTL-level).

Packing List

- CNT24-4(PCI)H ...1
- First step guide ...1
- CD-ROM*1 [API-PAC(W32)] ...1

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

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”.

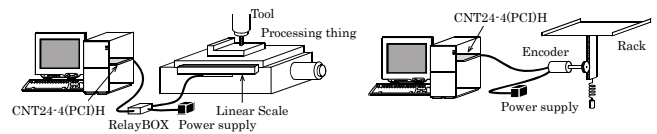
The pulse signal inputting interface is photo coupler isolated or TTL-level input.

Using the bundled driver library [API-PAC(W32)], you can create Windows application software for this board in your favorite programming language supporting Win32 API functions, such as Visual Basic or Visual C/C++.

< Example >

- Detecting a position of the table of a machine tool

- Detecting a change in weight

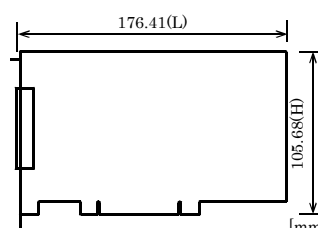


Specification

| Item | Specification |
|-----------------------------|--|
| Counter Input | |
| Number of Channels | 4 Channels |
| Count system | Up/down counting |
| Max. count | FFFFFFH (binary data) |
| Counter input type | Photo 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 resistor | 220Ω (photo coupler insulation) or more, 1TTL loading (TTL-level) |
| Input protection circuit | None |
| Response frequency | Photo coupler isolated input 500KHz duty 50% (Max.) TTL-level input 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) |
| Photo coupler input current | Photo 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. |
| Operating condition | 0 - 50°C, 10 - 90%RH (No condensation) |
| PCI bus specification | 32bit, 33MHz, Universal key shapes supported *1 |
| Dimension (mm) | 176.41(L) x 105.68(H) |
| Weight | 130g |

*1 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).

Board Dimensions



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

Support Software

Driver Library API-PAC(W32) (Bundled)

API-PAC(W32) is the library software that provides the commands for CONTEC hardware products in the form of Windows standard Win32 API functions (DLL). It makes it easy to create high-speed application software taking advantage of the CONTEC hardware using various programming languages that support Win32 API functions, such as Visual Basic and Visual C/C++.

It can also be used by the installed diagnosis program to check hardware operations.

CONTEC provides download services (at <http://www.contec.com/apipac/>) to supply the updated drivers and differential files.

For details, read Help on the bundled CD-ROM or visit the CONTEC's Web site.

< Operating environment >

OS Windows XP, 2000, NT, Me, 98, etc..
Adaptation language Visual C/C++, Visual Basic, Delphi, Builder, etc..
Others Each piece of library software requires 50 MB of free hard disk space.

Linux version of general-purpose COUNT driver: API-CNT(LNX) (Supplied within the same CD-ROM of API-PAC (W32))

This driver is used to control CONTEC counter boards (PC Cards).

You can control CONTEC counter boards easily using the shared library used by gcc, Kylix, the device driver (module) for each kernel version, and the board (PC Cards) configuration program (config).

CONTEC provides download services (at <http://www.contec.co.jp/enom/apipac/>) to supply the updated drivers and differential files.

For details, read Help on the bundled CD-ROM or visit the CONTEC's Web site.

< Operating environment >

OS RedHatLinux, TurboLinux, etc..
(For details on supported distributions, refer to Help available after installation.)
Adaptation language gcc, Kylix
Others Each piece of library software requires 3 MB of free hard disk space.

Data acquisition VI library for LabVIEW VI-DAQ (Free download)

This is a VI library to use in National Instruments LabVIEW. VI-DAQ is created with a function form similar to that of LabVIEW's Data Acquisition VI, allowing you to use various devices without complicated settings. See <http://www.contec.com/vidaq/> for details and download of VI-DAQ.

Cable & Connector

Cable(Optional)

Flat cable with both-ends 37-pin D-SUB connector
: PCB37P-1.5 (1.5m)
: PCB37P-3 (3m)
: PCB37P-5 (5m)

Shield cable with both-ends 37-pin D-SUB connector
: PCB37PS-0.5P (0.5m)
: PCB37PS-1.5P (1.5m)
: PCB37PS-3P (3m)
: PCB37PS-5P (5m)

Flat cable with one-end 37-Pin D-SUB connector
: PCA37P-1.5 (1.5m)
: PCA37P-3 (3m)
: PCA37P-5 (5m)

Shield cable with one-end 37-pin D-SUB connector
: PCA37PS-0.5P (0.5m)
: PCA37PS-1.5P (1.5m)
: PCA37PS-3P (3m)
: PCA37PS-5P (5m)

30-pin Pinhead Connector to 37-pin D-SUB Connector
: DT/B2 (0.5m)

Conversion Flat Cable : DT/O (1.5m)

Connector (Option)

37-pin D-SUB(male) connector Five-piece set
: CN5-D37M

Accessories

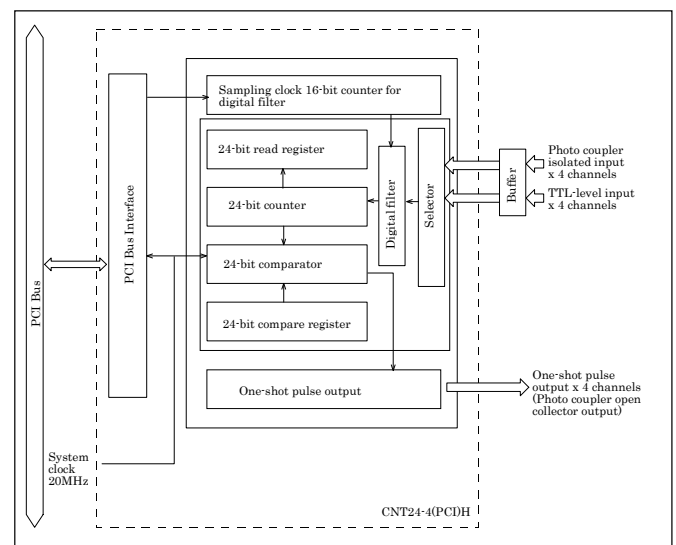
Accessories (Option)

Screw terminal : EPD-37A *1
Screw terminal (Screw Up type) : EPD-37 *1
Terminal unit for solderless terminal (M3) : DTP-3(PC)
Terminal unit for leads : DTP-4(PC)

*1 Option cable PCB37P or PCB37PS is required separately.

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

Block Diagram



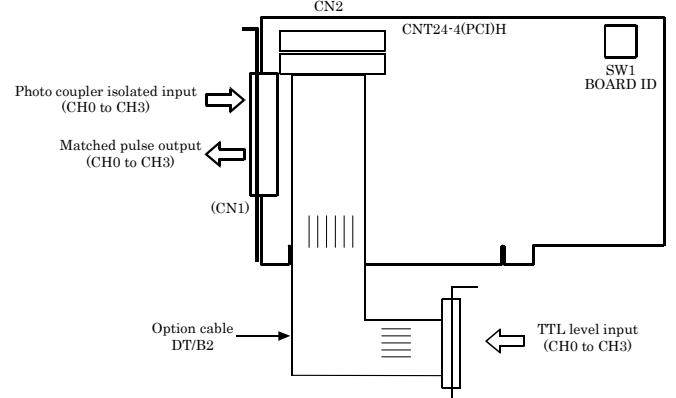
Using the On-Board Connectors

Connecting a Board to a Connector

To input external pulse signals, use the interface connector on the board.

Use CN1 for the photo coupler isolated input. For TTL level input, connect CN2 to an external device by connecting the optional cable CN2.

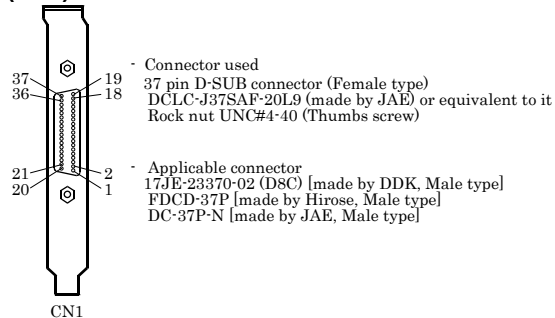
Matched pulse output is output from CN1. (Photo coupler isolated open collector output)



Interface Connector Signal Assignment

Use the on-board connector to connect the interface board to an external device.

Interface connector for the photo coupler isolated input(CN1)

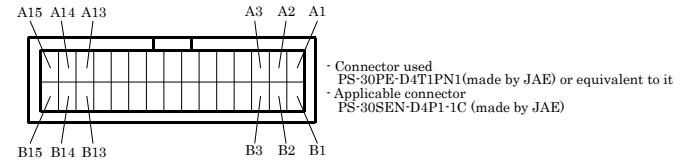


Pin Assignment of an interface connector(CN1)

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

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

Interface connector for the TTL-level input(CN2)



Pin Assignment of an interface connector(CN2)

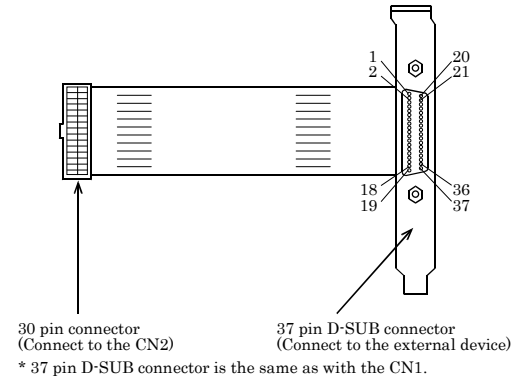
| | | | | | | | |
|-------|-----------------------|-------|-----|-----|-------|-----------------------|-----|
| CH1 | Not Connected | N.C. | A1 | B1 | T0A | Phase-A / UP | CH0 |
| | General-purpose Input | T1U | A2 | B2 | N.C. | Not Connected | |
| CH0 | Phase-Z / CLR | T1Z | A3 | B3 | GND*1 | Ground | CH3 |
| | Phase-B / DOWN | T1B | A4 | B4 | GND*1 | Ground | |
| CH0 | Phase-A / UP | T1A | A5 | B5 | GND*1 | Ground | CH2 |
| | Ground | GND*1 | A6 | B6 | GND*1 | Ground | |
| CH0 | General-purpose Input | T0U | A7 | B7 | GND*1 | Ground | CH3 |
| | Phase-Z / CLR | T0Z | A8 | B8 | GND*1 | Ground | |
| CH3 | Phase-B / DOWN | T0B | A9 | B9 | GND*1 | Ground | CH2 |
| | Not Connected | N.C. | A10 | B10 | T3A | Phase-A / UP | |
| CH3 | General-purpose Input | T3U | A11 | B11 | GND*1 | Ground | CH2 |
| | Phase-Z / CLR | T3Z | A12 | B12 | T2U | General-purpose Input | |
| CH2 | Phase-B / DOWN | T3B | A13 | B13 | T2Z | Phase-Z / CLR | CH2 |
| | Phase-A / UP | T2A | A14 | B14 | T2B | Phase-Z / CLR | |
| +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

| | | | | | | | |
|-----|-----------------------|-------|----|----|-------|-----------------------|-----|
| CH0 | Not Connected | GND*1 | 1 | 20 | Vcc*1 | +5V*2 | CH2 |
| | Phase-A / UP | T0A | 2 | 21 | Vcc*1 | +5V*2 | |
| CH0 | Phase-B / DOWN | T0B | 3 | 22 | N.C. | | CH3 |
| | Phase-Z / CLR | T0Z | 4 | 23 | N.C. | | |
| CH1 | General-purpose Input | T0U | 5 | 24 | N.C. | | CH0 |
| | Ground | GND*1 | 6 | 25 | N.C. | | |
| CH1 | Phase-A / UP | T1A | 7 | 26 | N.C. | | CH3 |
| | Phase-B / DOWN | T1B | 8 | 27 | N.C. | | |
| CH1 | Phase-Z / CLR | T1Z | 9 | 28 | T2A | Phase-A / UP | CH2 |
| | General-purpose Input | T1U | 10 | 29 | T2B | Phase-B / DOWN | |
| CH0 | Not Connected | N.C. | 11 | 30 | T2Z | Phase-Z / CLR | CH3 |
| | Not Connected | N.C. | 12 | 31 | T2U | General-purpose Input | |
| CH0 | Not Connected | N.C. | 13 | 32 | GND*1 | Ground | CH0 |
| | Not Connected | N.C. | 14 | 33 | T3A | Phase-A / UP | |
| CH0 | Not Connected | N.C. | 15 | 34 | T3B | Phase-B / DOWN | CH3 |
| | Not Connected | N.C. | 16 | 35 | T3Z | Phase-Z / CLR | |
| CH0 | Not Connected | N.C. | 17 | 36 | T3U | General-purpose Input | CH0 |
| | Not Connected | N.C. | 18 | 37 | N.C. | Not Connected | |

*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 as +5V power supply to an external device (such as an encoder) for simple checking.

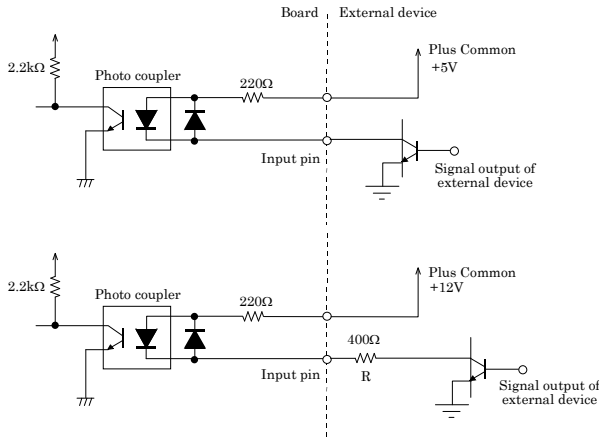
Connection Method to the External device 1 -Photo coupler isolated Input-

Photo coupler isolated Input Connection

Photo 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.

Photo 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 resistor 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.

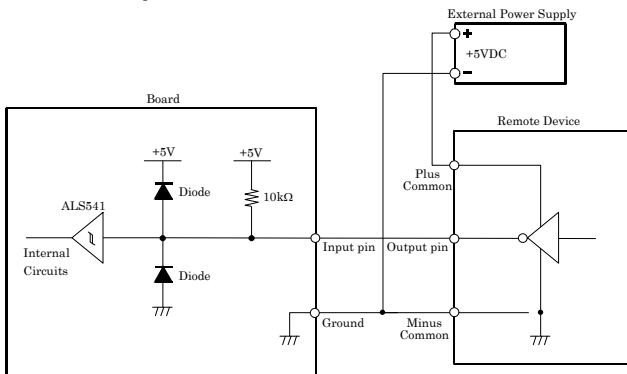
Connection Method to the External device 2 - TTL-Level Input -

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 cable should be 1.5m or less.

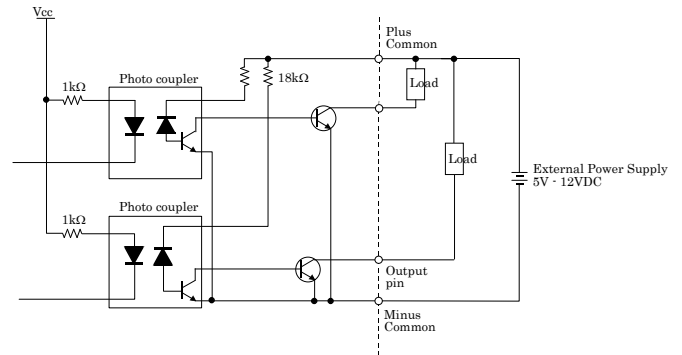
To prevent malfunction caused by noise, separate the circuit as much as possible from other signal cables and noise sources.

Digital I/O signals and Control signals

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 photo coupler insulation. As a result, an external power supply is needed to run the board output.

Output Circuit and an Example Connection



⚠ 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.

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

This product 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 |
|-----------------------------------|---|--|
| 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) |
| Interrupt signal resource setting | Set to select whether to use jumper JP1 | Automatically set by PC |
| Dimension (mm) | 121.69(L) x 106.68(H) | 121.69(L) x 105.68(H) |