4Ch 24Bit Up/Down Counter Card for Difference Input for PCI
CNT24-4D(PCI)H

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".
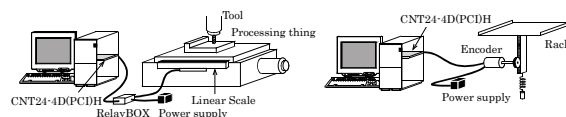
The pulse signal inputting interface is line receiver input or TTL-level input.

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

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

Features

This board is a PCI-compliant interface board for counting input pulse signals.

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 line-receiver 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 line-receiver and TTL-level).

Protective devices are equipped for line-receiver inputs.

Specification

Item		Specification
Counter Input		
	Number of Channels	4 Channels
	Count system	Up/down counting
	Max. count	FFFFFFH (binary data)
	Counter input type	Line-receiver 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
	Line receiver input section	Element in use: Equivalent to the AM26LS32(T.I) Terminating resistance: 100□(Can be disconnected by switch.) Receiver input ±200mV sensitivity: ±7V In-phase input voltage 1200m(dependent on wiring environment range: and input Signal extension frequency) distance:
	TTL level input section	Element in use: Equivalent to the SN74LS541(T.I) Signal extension 1.5m(dependent on wiring environment) distance
	Response frequency	Line-receiver input 1MHz 50% duty.(Max.) TTL-level input 1MHz 50% duty.(Max.)
	Interrupt	One Generated when each channel count matches or the timer runs out of time.
	Digital filter	0.1□sec - 1056.1□sec (can be independently set for each channel.)
	Timer	1msec - 200sec
Match signal output		
	Output point	1 x 4 channels
	Output type	Uninsulated open-collector output or TTL-level output (Selectable bt a switch.)
	Output rating	50VDC, 90mA(Max.) (per 1 point)
	Output signal width	0 - 104.45msec (All channels)
	Response rate	□□sec (Max.)
	Signal extension distance	1.5m (dependent on wiring environment)
	Output protection circuit	None
	External power	5V - 12VDC±10%
Common		
	I/O address	32 ports boundary
	Power consumption	5VDC 320mA Max. *1
	Operating condition	0 - 50°C, 10 - 90%RH (No condensation)
	PCI bus specification	32bit, 33MHz, Universal key shapes supported *2
	Dimension (mm)	121.69(L) × 105.68(H) *3
	Weight	120g
Certification		VCCI Class A, CE Marking (EMC Directive Class A, RoHS Directive), UKCA

*1   Boards with different board numbers are different in these specifications.   See Table 6.2
     "Different in the specification" at the end of this document.
*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.7294, No.7294A, and No.7294B is 176.41 (L) x 105.68 (H) mm.

Board Dimensions

121.69(L)

105.68(H)

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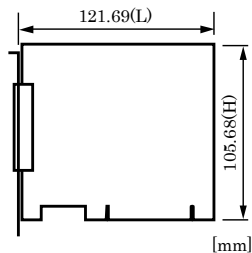
The standard outside dimension (L) is
the distance from the end of the board
to the outer surface of the slot cover.

Support Software

Driver Library API-CNT(WDM)
[Stored on the bundled Disk driver library API-PAC(W32)]
The API-CNT(WDM) / API-CNT(98/PC) is the Windows version
driver library 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.
You can download the updated version from the CONTEC's
Web site.   For more details on the supported OS, applicable
language and new information, please visit the CONTEC's
Web site.

**Linux version of general-purpose COUNT driver:
API-CNT(LNX)**
[Stored on the bundled Disk driver library 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, the device driver (module) for each
kernel version, and the board (PC Cards) configuration
program (config). CONTEC provides download services to
supply the updated drivers and differential files.
For more details on the supported OS, applicable language
and new information, please visit the CONTEC's Web site.

**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.
For more details on the supported OS, applicable language
and new information, please visit the CONTEC's Web site.

Cable & Connector

Cable (Option)

Shield Cable with 96-Pin Half-Pitch Connectors at Both Ends
                                : PCB96PS-0.5P (0.5m)
                                : PCB96PS-1.5P (1.5m)
                                : PCB96PS-3P (3m)
                                : PCB96PS-5P (5m)

Flat Cable with 96-Pin Half-Pitch Connectors at Both Ends
                                : PCB96P-1.5 (1.5m)
                                : PCB96P-3 (3m)
Shield Cable with 96-Pin Half-Pitch Connectors at One End
                                : PCA96PS-0.5P (0.5m)
                                : PCA96PS-1.5P (1.5m)
                                : PCA96PS-3P (3m)
                                : PCA96PS-5P (5m)

Flat Cable with 96-Pin Half-Pitch Connectors at One End
                                : PCA96P-1.5 (1.5m)
                                : PCA96P-3 (3m)
Distribution shield cable with 96-Pin Half-Pitch Connectors
(96P→37P x 2)   : PCB96WS-1.5P (1.5m)
                                : PCB96WS-3P (3m)
                                : PCB96WS-5P (5m)

Accessories

Accessories (Option)

Screw Terminal Unit (M3 x 96P)	: EPD-96A *1 *4
Screw Terminal Unit (M3.5 x 96P)	: EPD-96 *1
Terminal Unit for Cables (M2.5 x 96P)	: DTP-64A *1
General Purpose Terminal (M3 x 37P)	: DTP-3C *2
Screw Terminal (M2.5 x 37P)	: DTP-4C *2
Screw Terminal Unit (M3 x 37P)	: EPD-37A *2 *4
Screw Terminal Unit (M3.5 x 37P)	: EPD-37 *2
Connection Conversion Board (96-Pin → 37-Pin x 2)	
	: CCB-96 *3

*1   A PCB96P or PCB96PS optional cable is required separately.
*2   A PCB96W or PCB96WS optional cable is required separately.
*3   Option cable PCB96P or PCB96PS, and the cable for 37-pin D-SUB are required
     separately.
*4   "Spring-up" type terminal is used to prevent terminal screws from falling off.

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

Included Items

CNT24-4D(PCI)H …1
Please read the following …1

Block Diagram

CNT24-4D(PCI)H

Labels within diagram: PCI Bus · PCI Bus Interface · 16-bit, sampling-clock counter for digital filter · 24-bit readout register · 24-bit counter · 24-bit comparator · 24-bit compare register · Digital filter · Selector · Buffer · Line-receiver input x 4 channels · TTL-level input x 4 channels · One-shot pulse output · One-shot pulse output x 4 channels (TTL-level output or open-collector output can be selected.) · 20MHz system clock

Using the On-board Connectors

Connecting the Interface Connector
To connect an external device to this board, plug the cable from the device into the interface connector shown below.

Interface connector (CN1)

B48 A48
B47 A47

B02 A02
B01 A01

- Connector used (PCR-E96LMD ((mfd. by HONDA))
- Applicable connectors (PCR-E96FA ((mfd. by HONDA))

Connector Pin Assignment
Pin Assignments of Interface Connector

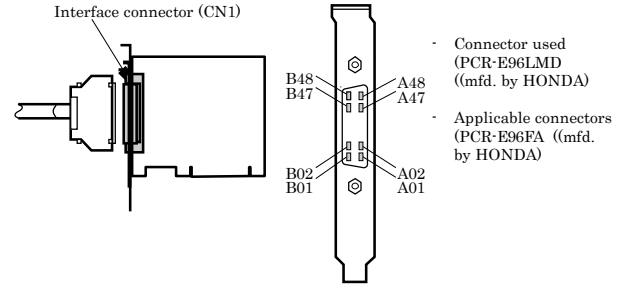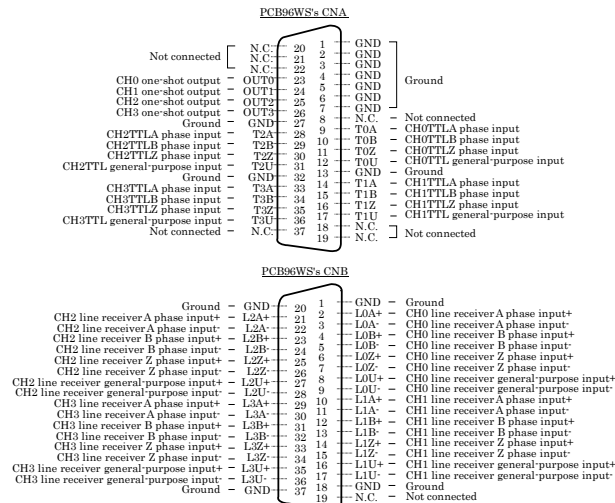| Signal	Signal name	B [49]	A [1]	Signal name	Signal
Ground	GND	B48	A48	N.C.	Not connected
Ground	GND	B47	A47	N.C.	Not connected
CH3 line receiver general-purpose input-	L3U-	B46	A46	T3U	CH3 TTL general-purpose input
CH3 line receiver general-purpose input+	L3U+	B45	A45	T3Z	CH3 TTL Z phase input
CH3 line receiver Z phase input-	L3Z-	B44	A44	T3B	CH3 TTL B phase input
CH3 line receiver Z phase input+	L3Z+	B43	A43	T3A	CH3 TTL A phase input
CH3 line receiver B phase input-	L3B-	B42	A42	GND	Ground
CH3 line receiver B phase input+	L3B+	B41	A41	T2U	CH2 TTL general-purpose input
CH3 line receiver A phase input-	L3A-	B40	A40	T2Z	CH2 TTL Z phase input
CH3 line receiver A phase input+	L3A+	B39	A39	T2B	CH2 TTL B phase input
CH2 line receiver general-purpose input-	L2U-	B38	A38	T2A	CH2 TTL A phase input
CH2 line receiver general-purpose input+	L2U+	B37	A37	GND	Ground
CH2 line receiver Z phase input-	L2Z-	B36	A36	OUT3	CH3 one-shot output
CH2 line receiver Z phase input+	L2Z+	B35	A35	OUT2	CH2 one-shot output
CH2 line receiver B phase input-	L2B-	B34	A34	OUT1	CH1 one-shot output
CH2 line receiver B phase input+	L2B+	B33	A33	OUT0	CH0 one-shot output
CH2 line receiver A phase input-	L2A-	B32	A32	N.C.	
CH2 line receiver A phase input+	L2A+	B31	A31	N.C.	Not connected
	GND	B30	A30	N.C.	
	GND	B29	A29	N.C.	
	GND	B28	A28	GND	
	GND	B27	A27	GND	
	GND	B26	A26	GND	
Ground	GND	B25	A25	GND	Ground
	GND	B24	A24	GND	
	GND	B23	A23	GND	
	GND	B22	A22	GND	
	GND	B21	A21	GND	
	GND	B20	A20	N.C.	
	GND	B19	A19	N.C.	Not connected
CH1 line receiver general-purpose input-	L1U-	B18	A18	T1U	CH1 TTL general-purpose input
CH1 line receiver general-purpose input+	L1U+	B17	A17	T1Z	CH1 TTL Z phase input
CH1 line receiver Z phase input-	L1Z-	B16	A16	T1B	CH1 TTL B phase input
CH1 line receiver Z phase input+	L1Z+	B15	A15	T1A	CH1 TTL A phase input
CH1 line receiver B phase input-	L1B-	B14	A14	GND	Ground
CH1 line receiver B phase input+	L1B+	B13	A13	T0U	CH0 TTL general-purpose input
CH1 line receiver A phase input-	L1A-	B12	A12	T0Z	CH0 TTL Z phase input
CH1 line receiver A phase input+	L1A+	B11	A11	T0B	CH0 TTL B phase input
CH0 line receiver general-purpose input-	L0U-	B10	A10	T0A	CH0 TTL A phase input
CH0 line receiver general-purpose input+	L0U+	B09	A09	N.C.	Not connected
CH0 line receiver Z phase input-	L0Z-	B08	A08	GND	
CH0 line receiver Z phase input+	L0Z+	B07	A07	GND	
CH0 line receiver B phase input-	L0B-	B06	A06	GND	
CH0 line receiver B phase input+	L0B+	B05	A05	GND	Ground
CH0 line receiver A phase input-	L0A-	B04	A04	GND	
CH0 line receiver A phase input+	L0A+	B03	A03	GND	
Ground	GND	B02	A02	GND	
Ground	GND	B01 [96]	A01 [48]	N.C.	Not connected

* [Pin numbers specified by HONDA]

PCB96WS and CCB-96 Signal Assignment

This board can be connected to the PCB96WS and CCB-96.
(But the GND's pin will be decreased.)
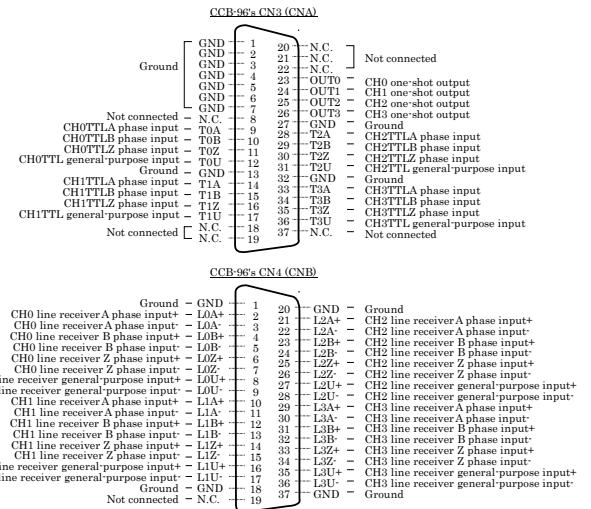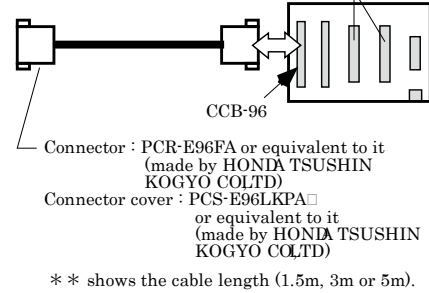For the optional cable and each signal, please refer to the following parts.

- Option cable PCB96WS-＊＊

Connector：17JE-23370-02(D8C)
or equivalent to it
(made by DDK)

Connector：PCR-E96FA or equivalent to it
(made by HONDA TSUSHIN
KOGYO CO.,LTD.)
Connector cover：PCS-E96LKPA □
or equivalent to it
(made by HONDA TSUSHIN
KOGYO CO.LTD)

The optional cables and each corresponding signal are as shown below:

PCB96WS's CNA

Not connected	N.C.	20	1	GND	Ground
	N.C.	21	2	GND	
	N.C.	22	3	GND	
CH0 one-shot output	OUT0	23	4	GND	
CH1 one-shot output	OUT1	24	5	GND	
CH2 one-shot output	OUT2	25	6	GND	
CH3 one-shot output	OUT3	26	7	N.C.	Not connected
Ground	GND	27	8	T0A	CH0TTLA phase input
CH2TTLA phase input	T2A	28	9	T0B	CH0TTLB phase input
CH2TTLB phase input	T2B	29	10	T0Z	CH0TTLZ phase input
CH2TTLZ phase input	T2Z	30	11	T0U	CH0TTL general-purpose input
CH2TTL general-purpose input	T2U	31	12	GND	Ground
Ground	GND	32	13	T1A	CH1TTLA phase input
CH3TTLA phase input	T3A	33	14	T1B	CH1TTLB phase input
CH3TTLB phase input	T3B	34	15	T1Z	CH1TTLZ phase input
CH3TTLZ phase input	T3Z	35	16	T1U	CH1TTL general-purpose input
CH3TTL general-purpose input	T3U	36	17	N.C.	Not connected
Not connected	N.C.	37	18	N.C.	
			19		

PCB96WS's CNB

Ground	GND	20	1	GND	Ground
CH2 line receiver A phase input+	L2A+	21	2	L0A+	CH0 line receiver A phase input+
CH2 line receiver A phase input-	L2A-	22	3	L0A-	CH0 line receiver A phase input-
CH2 line receiver B phase input+	L2B+	23	4	L0B+	CH0 line receiver B phase input+
CH2 line receiver B phase input-	L2B-	24	5	L0B-	CH0 line receiver B phase input-
CH2 line receiver Z phase input+	L2Z+	25	6	L0Z+	CH0 line receiver Z phase input+
CH2 line receiver Z phase input-	L2Z-	26	7	L0Z-	CH0 line receiver Z phase input-
CH2 line receiver general-purpose input+	L2U+	27	8	L0U+	CH0 line receiver general-purpose input+
CH2 line receiver general-purpose input-	L2U-	28	9	L0U-	CH0 line receiver general-purpose input-
CH3 line receiver A phase input+	L3A+	29	10	L1A+	CH1 line receiver A phase input+
CH3 line receiver A phase input-	L3A-	30	11	L1A-	CH1 line receiver A phase input-
CH3 line receiver B phase input+	L3B+	31	12	L1B+	CH1 line receiver B phase input+
CH3 line receiver B phase input-	L3B-	32	13	L1B-	CH1 line receiver B phase input-
CH3 line receiver Z phase input+	L3Z+	33	14	L1Z+	CH1 line receiver Z phase input+
CH3 line receiver Z phase input-	L3Z-	34	15	L1Z-	CH1 line receiver Z phase input-
CH3 line receiver general-purpose input+	L3U+	35	16	L1U+	CH1 line receiver general-purpose input+
CH3 line receiver general-purpose input-	L3U-	36	17	L1U-	CH1 line receiver general-purpose input-
Ground	GND	37	18	GND	Ground
			19	N.C.	Not connected

- Option cable PCB96PS-＊」
 + Connector conversion board CCB-96
 Connector：DCLC-J37SAF-20L9
 or equivalent to it
 (made by JAE)

CCB-96

Connector：PCR-E96FA or equivalent to it
(made by HONDA TSUSHIN
KOGYO CO.LTD)
Connector cover：PCS-E96LKPA□
or equivalent to it
(made by HONDA TSUSHIN
KOGYO CO.LTD)

＊＊ shows the cable length (1.5m, 3m or 5m).

CCB-96's CN3 (CNA)

Ground	GND	1	20	N.C.	Not connected
	GND	2	21	N.C.	
	GND	3	22	N.C.	
	GND	4	23	OUT0	CH0 one-shot output
	GND	5	24	OUT1	CH1 one-shot output
	GND	6	25	OUT2	CH2 one-shot output
Not connected	N.C.	7	26	OUT3	CH3 one-shot output
	N.C.	8	27	GND	Ground
CH0TTLA phase input	T0A	9	28	T2A	CH2TTLA phase input
CH0TTLB phase input	T0B	10	29	T2B	CH2TTLB phase input
CH0TTLZ phase input	T0Z	11	30	T2Z	CH2TTLZ phase input
CH0TTL general-purpose input	T0U	12	31	T2U	CH2TTL general-purpose input
Ground	GND	13	32	GND	Ground
CH1TTLA phase input	T1A	14	33	T3A	CH3TTLA phase input
CH1TTLB phase input	T1B	15	34	T3B	CH3TTLB phase input
CH1TTLZ phase input	T1Z	16	35	T3Z	CH3TTLZ phase input
CH1TTL general-purpose input	T1U	17	36	T3U	CH3TTL general-purpose input
Not connected	N.C.	18		N.C.	Not connected
	N.C.	19			

CCB-96's CN4 (CNB)

|					
Ground	GND	1	20	GND	Ground
CH0 line receiver A phase input+	L0A+	2	21	L2A+	CH2 line receiver A phase input+
CH0 line receiver A phase input-	L0A-	3	22	L2A-	CH2 line receiver A phase input-
CH0 line receiver B phase input+	L0B+	4	23	L2B+	CH2 line receiver B phase input+
CH0 line receiver B phase input-	L0B-	5	24	L2B-	CH2 line receiver B phase input-
CH0 line receiver Z phase input+	L0Z+	6	25	L2Z+	CH2 line receiver Z phase input+
CH0 line receiver Z phase input-	L0Z-	7	26	L2Z-	CH2 line receiver Z phase input-
CH0 line receiver general-purpose input+	L0U+	8	27	L2U+	CH2 line receiver general-purpose input+
CH0 line receiver general-purpose input-	L0U-	9	28	L2U-	CH2 line receiver general-purpose input-
CH1 line receiver A phase input+	L1A+	10	29	L3A+	CH3 line receiver A phase input+
CH1 line receiver A phase input-	L1A-	11	30	L3A-	CH3 line receiver A phase input-
CH1 line receiver B phase input+	L1B+	12	31	L3B+	CH3 line receiver B phase input+
CH1 line receiver B phase input-	L1B-	13	32	L3B-	CH3 line receiver B phase input-
CH1 line receiver Z phase input+	L1Z+	14	33	L3Z+	CH3 line receiver Z phase input+
CH1 line receiver Z phase input-	L1Z-	15	34	L3Z-	CH3 line receiver Z phase input-
CH1 line receiver general-purpose input+	L1U+	16	35	L3U+	CH3 line receiver general-purpose input+
CH1 line receiver general-purpose input-	L1U-	17	36	L3U-	CH3 line receiver general-purpose input-
Ground	GND	18		GND	Ground
Not connected	N.C.	19			

Line Receiver Input Circuit

Use the line receiver input to connect to the line receiver output circuit of a rotary encoder or linear scale. The maximum input frequency is 1 MHz.
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.
You can select whether to use the terminator in case of the line receiver input.

Detailed Line Receiver Input Circuit
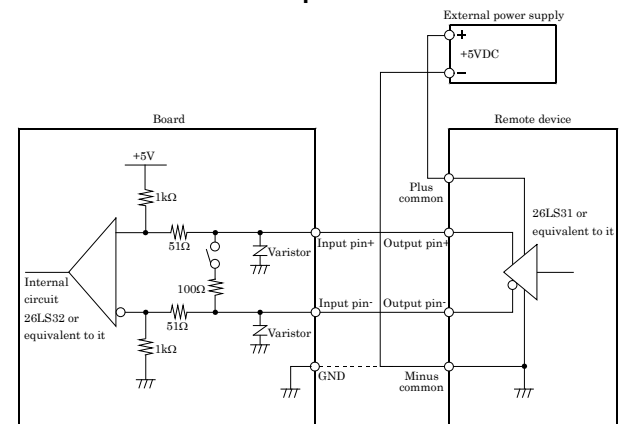
⚠ CAUTION
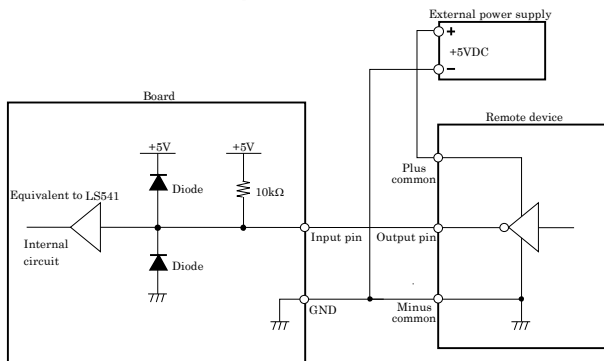The general input signal uses the same circuit structure.

External Connection-TTL-level Input

TTL-level Input Circuit
Use the TTL-level input to connect to the TTL-level output circuit of a rotary encoder or linear scale.   The maximum input frequency is 1 MHz.
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.
You can select whether to use the terminator in case of the line receiver input.

Detailed 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.

Output Circuit and an Example Connection

One-shot Pulse Output Connection
When the count value of each channel matches any specified value, the board outputs a one-shot match signal (for one pulse).   The SW2 allows you to select either open-collector output or TTL-level output for the signal output section.   If you opt for open-collector output, you need an external power supply source.

Output Circuit and an Example Connection
Open Collector Output Circuit
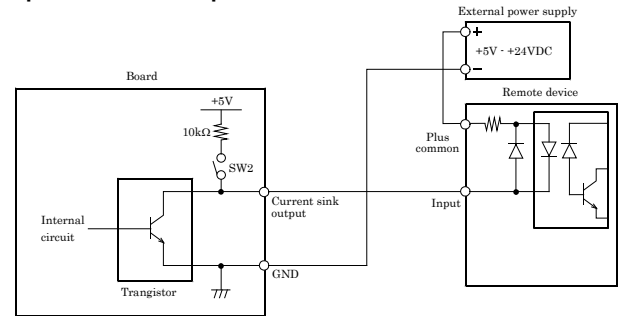
TTL-level Output Circuit
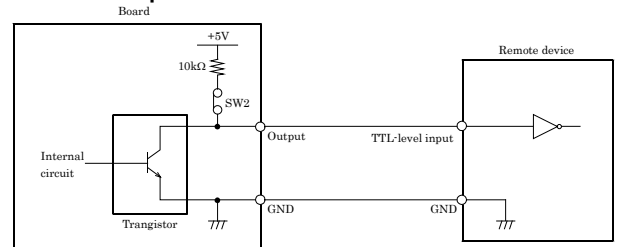
⚠ CAUTION

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.

Different in the specification

The CNT24-4D(PCI)H different in specifications, depending on the board number as listed below.

CNT24-4D(PCDH

Board No.	No.7294	No.7294A	No.7294B	No.7294C later
Power consumption	5VDC 500mA (Max.)	5VDC 500mA (Max.)	5VDC 670mA (Max.)	5VDC 320mA (Max.)
Dimension (mm)	176.41(L)×105.68(H)	176.41(L)×105.68(H)	176.41(L)×105.68(H)	121.69(L)×105.68(H)

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

The CNT24-4D(PCI)H partially enhanced version of the conventional products of CNT24-4D(PCI) and it is upper compatible with CNT24-4D(PCI).

(1)There are difference in the board's external dimension

 CNT24-4D(PCI): 176.41(L) x 106.68(H) mm

 CNT24-4D(PCI)H: 176.41(L) x 105.68(H)mm

  (Board No.7294, 7294A, 7294B)

 CNT24-4D(PCI)H: 121.69(L)×105.68(H) mm

  (Board No.7294C later)