

## 4-Axis Steper Motor Controller Board

### SMC-4P(PCI)



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

### Features

This board has the following features compared to conventional motion control boards.

#### Faster to set up

When it comes to "motion control under Windows", quite a few customers spend a lot of time to set up their control board and check wiring.

CONTEC offers a set of utilities for Windows to reduce the time for setting up the development environment. You can use the initialization utility first to set up your board easily with the wizard. You can then use the diagnosis utility to check wiring easily.

#### Easier to handle

Software is provided to make all of the board settings except the board ID number.

For wiring, a dedicated screw terminal designed focusing on ease of use is available (as an option).

#### Covering a wider range of application

The board can serve for a wide range of application depending on your needs, from a simple test equipment to a complicated robot controller. The motor controllable with the board is a stepping motor or (a pulse-train input type of) servomotor.

#### Faster position control

The board can store up to 1000 frames, with one frame as a set of information required for one action of positioning, such as the speed, acceleration/deceleration rate, and target position. The board controls the switching from one frame to the next without CPU intervention, allowing a complicated sequence of positioning operations to be performed at high speed.

#### Controlling a larger number of axes

The board can control a large number of axes (up to 64 axes) synchronously. As synchronous control, the board is capable of grouped-axis simultaneous start/stop control and multi-axis continuous PTP control.

With this feature, the board can operate your multi-axis system faster with higher precision.

This product is a motion control board that positions a stepping motor or (a pulse-train input type of) servomotor. The target of the controller is the motor driver unit provided by each motor manufacturer.

CONTEC also offers a driver to easily handle a wealth of functions of the motion control board on Windows.

This board covers a wide range of applications including semiconductor equipment, test instruments, multi-axis robots, and X-Y robots.

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++.

### Specification

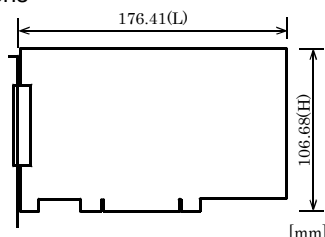
#### Common Section

Item	Specification
Control target	Stepping motor or servo motor driver unit(pulse train input type)
Number of axes to control	4axes
Interrupt	None
Device used	PCL5014(Nippon Pulse Motor CO., LTD.)
I/O address	Any 16-byte boundary
Current consumption	5VDC 900mA Max.
Operating condition	0 - 50°C, 10 - 90% (no condensation)
Connecting distance	3m(Typ.)(depending on wiring environment)
PCI bus specification	32-bit, 33MHz, Universal key shapes supported *1*2
Dimension (mm)	176.41(L) x 106.68(H)
Connector used	PCR-E96LMD or equivalent to it [made by HONDA TSUSHIN KOGYO CO., LTD.]
Weight	130g

\*1 This board requires power supply at +5 V from an expansion slot (it does not work on a machine with a +3.3V power supply alone).

\*2 If the board No. is 7148A, PCI bus specification is 32bit, 33MHz, 5V.

#### Board Dimensions



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

#### Encoder Input Section

Item	Specification
Encode type	Incremental
Maximum counter value	FFFFFFFF(-134,217,728 to 134,217,727), 28bit
Input signal type	Single-phase input(UP/DOWN/Z) Phase input(A/B/Z)
Input type	High-speed opto-isolated input
Response frequency (Max.)	1MHz
Input resistor	A, B : 220Ω Z : 510Ω
Input ON current	5.0mA or more
Input OFF current	0.5mA or less
External circuit power supply	5 - 24VDC(±15%)

## Limit Input Section

Item	Specification
Signal channel	3/ch(original point, Forward limit, Reverse limit)
Input signal name	ORG : Original input +LIM : positive-direction stop input -LIM : positive-direction stop input
Input logic	ORG : Enables selecting the positive/negative logic by using the Software +LIM, -LIM : Positive logic
Input type	Opto-isolated input
Response time (Max.)	1msec
Input resistor	3kΩ
Input ON current	3.4mA or more
Input OFF current	0.16mA or less
External circuit power supply	12 - 24VDC(±15%)

## General-purpose Input Section

Item	Specification
Signal channel	7/ch
Input signal name	IN1/ALM : Alarm input, General-purpose input IN2/INP : Positioning completion input, General-purpose input IN3/+SD : Positive-direction deceleration stop input, General-purpose input IN4/-SD : Negative-direction deceleration stop input, General-purpose input IN5 : General-purpose input IN6 : General-purpose input IN7 : General-purpose input
Input logic	Enables selecting the positive/negative logic by using the Software
Input type	IN2 : High-speed Opto-isolated input IN1, IN3 - IN7 : Opto-isolated input
Response time	IN2 : 1μsec Max. IN1, IN3 - IN7 : 1msec Max.
Input resistor	IN2 : 1.8kΩ IN1, IN3 - IN7 : 3kΩ
Input ON current	IN2 : 5.0mA or more IN1, IN3 - IN7 : 3.4mA or more
Input OFF current	IN2 : 0.5mA or less IN1, IN3 - IN7 : 0.16mA or less
External circuit power supply	12 - 24VDC(±15%)

## Pulse Output Section

Item	Specification
Pulse rate	0.1 - 1Mpps
Output signal name	PCW : Pulse/CW output DCCW : Direction/CCW output
Output system	2 Pulse types(pulse for positive/negative direction) or the common pulse type(pulse signal/directional signal)
Signal specification	Non-isolated open collector output (Enables selecting the positive/negative logic by using the Software)
Response time	1μsec Max.
Rated output current	100mA Max. per pin
Rated output withstanding voltage	35VDC Max.

## Clear Pulse Output Section

Item	Specification
Output signal name	OUT2/ALMCLR : Alarm clear output OUT3/CNTCLR : Deviation counter clear output
Output clear pulse width	Select one of 100μsec, 1msec, 10msec and 100msec.
Output system	2 Pulse types(pulse for positive/negative direction) or the common pulse type(pulse signal/directional signal)
Signal specification	Non-isolated open collector output (Enables selecting the positive/negative logic by using the Software)
Response time	1μsec Max.
Pulse width error	Within ±1μsec
Rated output current	100mA Max. per pin
Rated output withstanding voltage	35VDC Max.

## General-purpose Output Section

Item	Specification
Output signal name	OUT1/H.OFF : General-purpose output OUT2/ALMCLR : General-purpose output OUT3/CNTCLR : General-purpose output
Output system	2 Pulse types(pulse for positive/negative direction) or the common pulse type(pulse signal/directional signal)
Signal specification	Non-isolated open collector output (Enables selecting the positive/negative logic by using the Software)
Response time	1μsec Max.
Rated output current	100mA Max. per pin
Rated output withstanding voltage	35VDC Max.

## Support Software

### Windows version of motion control driver API-SMC(98/PC) [Stored on the bundled CD-ROM driver library API-PAC(W32)]

The API-SMC(WDM) 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.

#### < Operating environment >

OS Windows XP, Server 2003, 2000, Me, 98, etc..

Adaptation language Visual C++ .NET, Visual C# .NET, Visual Basic .NET, Visual C++, Visual Basic, Delphi, C++Builder, etc..

You can download the updated version from the CONTEC's Web site (<http://www.contec.com/apipac/>). For more details on the supported OS, applicable language and new information, please visit the CONTEC's Web site.

## Cable & Connector

### Cable(Optional)

Shield Cable with 96-Pin Half-Pitch Connector at Both Ends (Mold Type) : 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)  
: PCB96P-5 (5m)

Shield Cable with 96-Pin Half-Pitch Connector at One End (Mold Type) : PCA96PS-0.5P (0.5m)  
: PCA96PS-1.5P (1.5m)  
: PCA96PS-3P (3m)  
: PCA96PS-5P (5m)

Flat Cable with One 96-pin Half-Pitch Connector : PCA96P-1.5 (1.5m)  
: PCA96P-3 (3m)  
: PCA96P-5 (5m)

### Connector(Optional)

Half Pitch 96P Female Connector Set (5 Pieces) : CN5-H96F

#### ⚠ CAUTION

The maximum signal extensible distance satisfying the board specifications is 3 m. Purchase the appropriate cable depending on the operating environment.

## Accessories

Connection Conversion Board for SMC-P Series : CCB-SMC1 \*1  
Screw Terminal (M3\*96) : EPD-96A \*2\*3  
Screw Terminal (M3.5\*96) : EPD-96 \*2

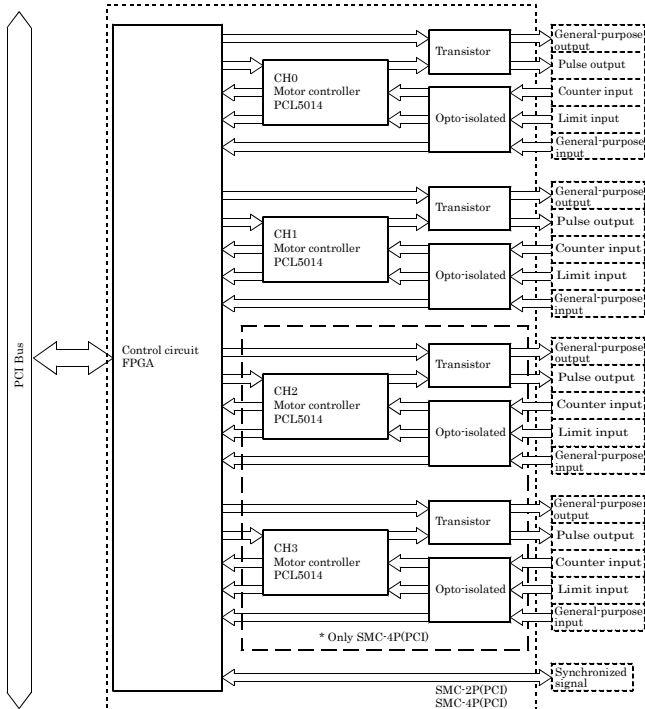
- \*1 The screw terminal is dedicated to the SMC-\*P(PCI) for distribution from one 96-pin half-pitch connector to four 37-pin D-SUB connectors. This requires an optional cable (PCB96PS).
- \*2 A PCB96PS optional cable is required separately.
- \*3 "Spring-up" type terminal is used to prevent terminal screws from falling off.
- \* Check the CONTEC's Web site for more information on these options.

## Packing List

Board [SMC-4P(PCI)] ...1  
First step guide ...1  
CD-ROM \*1 [API-PAC(W32)]...1  
Synchronization control cable (10cm)...1

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

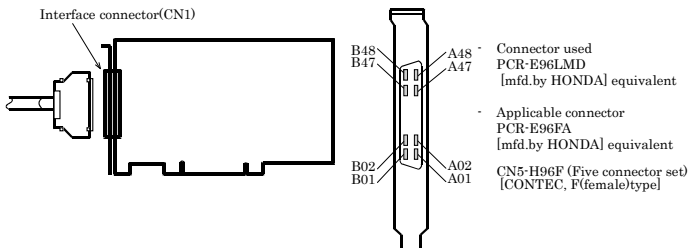
## Block Diagram



## Using the On-board Connectors

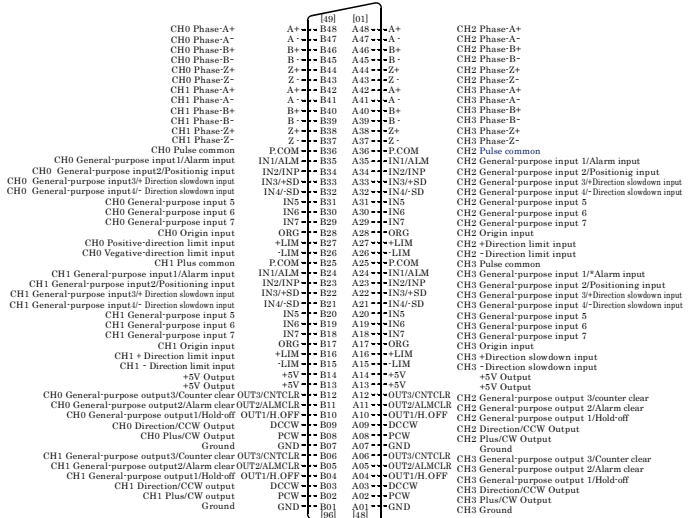
### Connecting a Device to a Connector

To connect an external device to this board, plug the cable from the device into the interface connector (CN1) shown below.



### Connector Pin Assignment

This interface board is connected to an external device through the on-board connector.



\*The numbers in square brackets [ ] are pin numbers designated by HONDA TSUSHIN KOGYO CO., LTD.

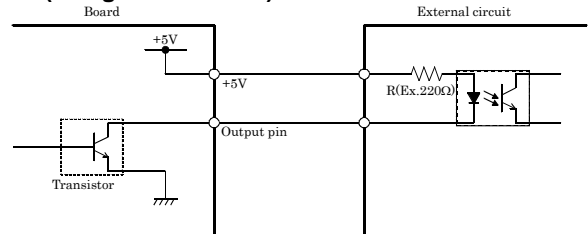
Note!  
In the connector on the SMC-2P(PCD), A01 to A48 are N.C. (no connection).

## Connecting Output Signals

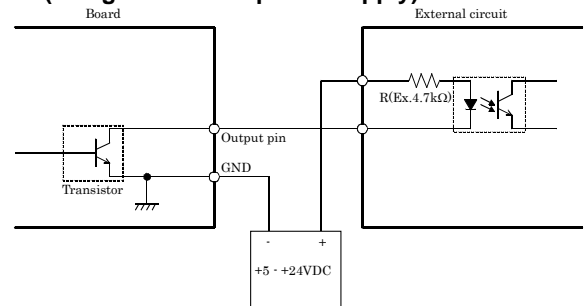
### Pulse output/general-purpose output/clear pulse output circuit (PCW, DCCW, OUT1/H.OFF, OUT2/ALMCLR, OUT3/CNTCLR)

The pulse output/general-purpose output/clear pulse output circuit on this board is illustrated below. The signal output is a non-isolated open-collector output. The driving power supply can be internal +5 V.

### Pulse output/general-purpose output/clear pulse output circuit (using internal +5 V)



### Pulse output/general-purpose output/clear pulse output circuit (using an external power supply)

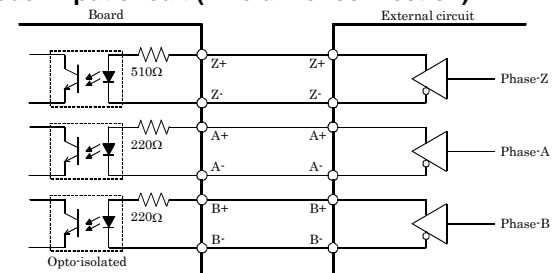


## Connecting Input Signals

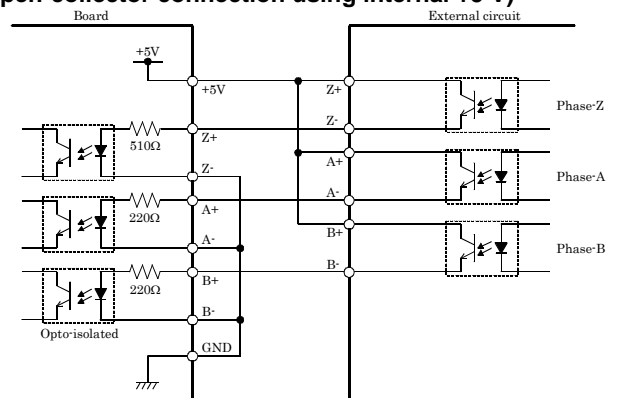
### Encoder input circuit

The encoder input circuit on this board permits both of line-driver connection and open-collector connection, either of which can be selected depending on the application. The signal input is an opto-isolated input. The driving power supply can be internal +5 V.

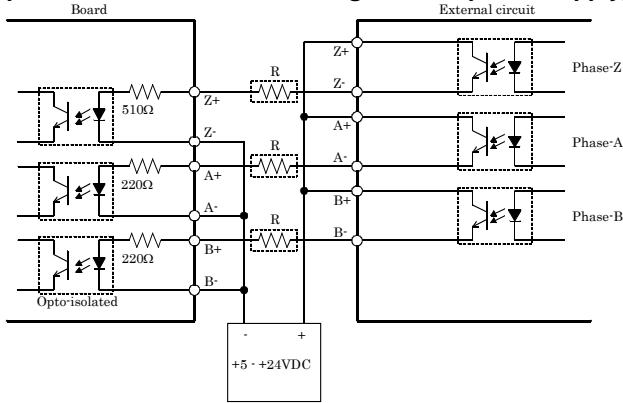
### Encoder input circuit (Line driver connection)



### Encoder input circuit (Open-collector connection using internal +5 V)



## Encoder input circuit (Open-collector connection using external power supply)



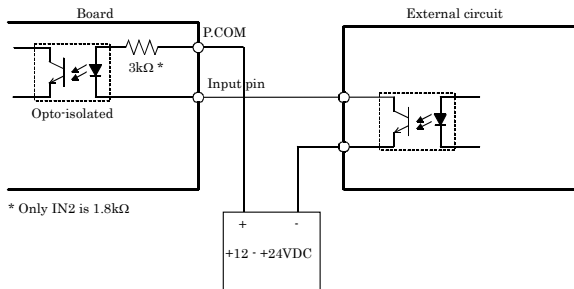
For open-collector output using an external power supply of +12 - +24 V, insert current-limiting resistor R as shown in the diagram above. The R values are as follows. No R is required when +5 V is used.

- (1) Phase-A, Phase-B  
+12V : R = 370 - 680Ω  
+24V : R = 1.1k - 1.7kΩ
- (2) Phase-Z  
+12V : R = 670 - 1280Ω  
+24V : R = 2k - 3.4kΩ

## Limit output/general-purpose output/clear pulse output circuit (IN1 - IN7, +LIM, -LIM, ORG)

The limit input/general-purpose input/control input circuit on this board is illustrated below. The signal input is an opto-isolated, current driven input (source type). To drive the limit input/general-purpose input/control input block, therefore, an external power supply is required at +12 - +24 V.

## Limit output/general-purpose output/clear pulse output circuit

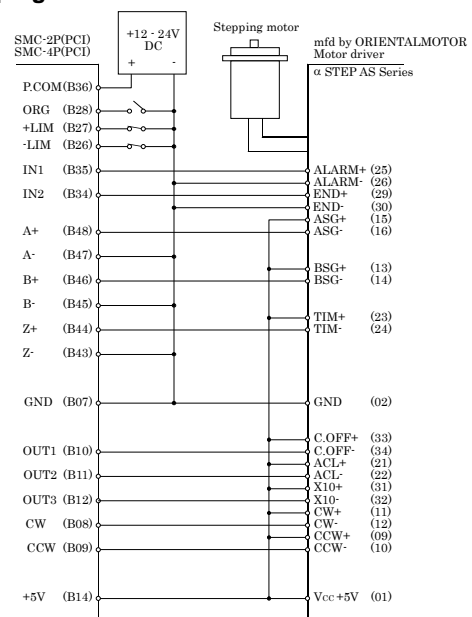


## Connection Examples

Given below are practical examples of connection of this product that outputs pulses by the independent pulsing method to motor drivers.

These examples show the connections through channel 0.

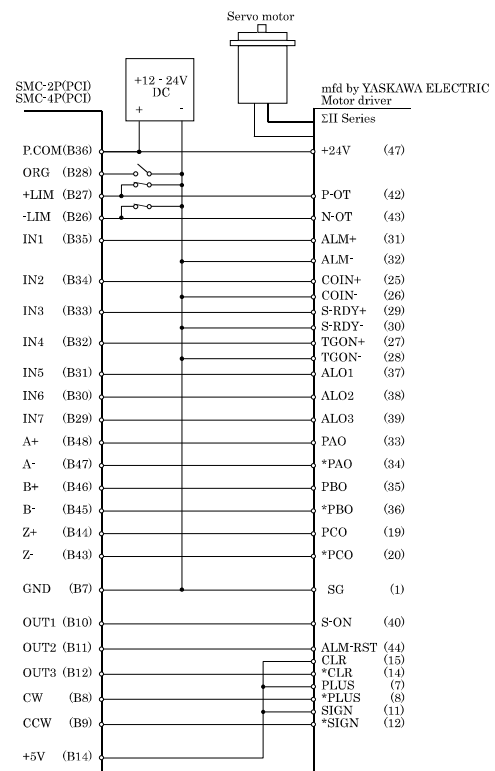
## Example of Connection to driver unit (α STEP AS Series) for Stepping motor



### CAUTION

The limit input of this board is fail-safe so that operation in a safe direction can be assured even when some trouble such as discontinuity in a signal conductor occurs. You should therefore use a normally closed (B-contact) switch.

## Example of Connection to driver unit (Σ II Series) for Servo motor



### CAUTION

The limit input of this board is fail-safe so that operation in a safe direction can be assured even when some trouble such as discontinuity in a signal conductor occurs. You should therefore use a normally closed (B-contact) switch.