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Find the *Contec SMC-4P(PCI)* at our website: *Click HERE*

4-Axis Steper Motor Controller Board

SMC-4P(PCI)



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++.

* 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.

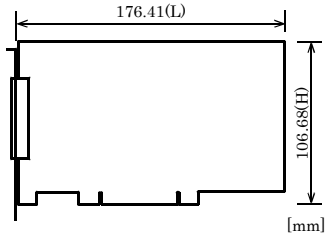
Specification

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	FFFFFFFH(-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 resister	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 resister	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 resister	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(Option)

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(Option)

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.

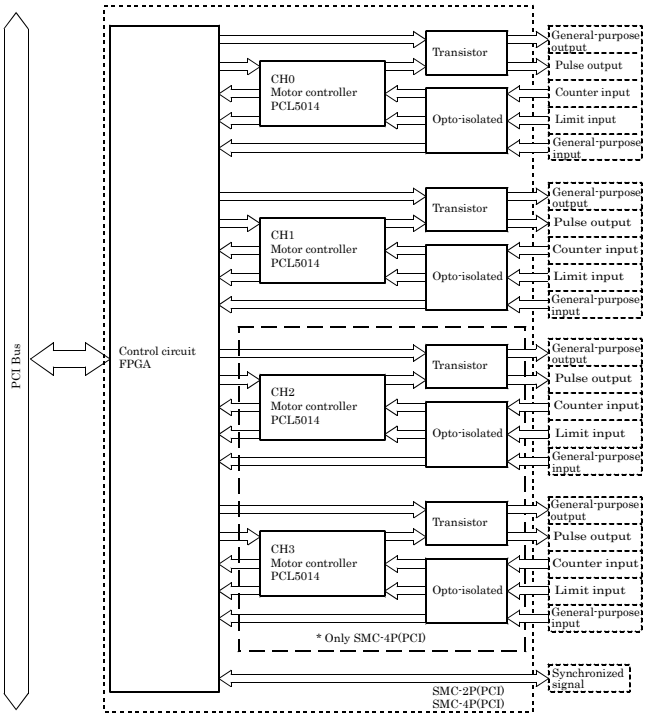
* Check the CONTEC's Web site for more information on these options.

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

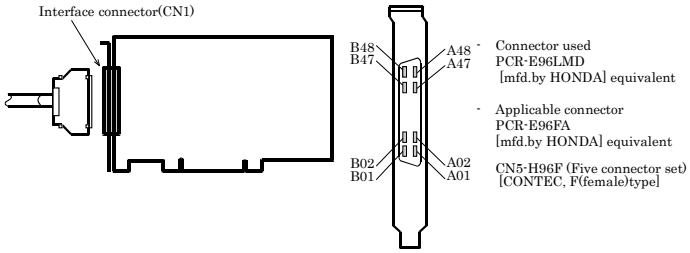
Block Diagram



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 used
  PCR-E96LMD
  [mfd.by HONDA] equivalent
- Applicable connector
  PCR-E96FA
  [mfd.by HONDA] equivalent

CN5-H96F (Five connector set)
[CONTEC, F(female)type]

Connector Pin Assignment

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

		[49]	[01]		
CH0 Phase-A+	A+	B48	A48	A+	CH2 Phase-A+
CH0 Phase-A-	A-	B47	A47	A-	CH2 Phase-A-
CH0 Phase-B+	B+	B46	A46	B+	CH2 Phase-B+
CH0 Phase-B-	B-	B45	A45	B-	CH2 Phase-B-
CH0 Phase-Z+	Z+	B44	A44	Z+	CH2 Phase-Z+
CH0 Phase-Z-	Z-	B43	A43	Z-	CH2 Phase-Z-
CH1 Phase-A+	A+	B42	A42	A+	CH3 Phase-A+
CH1 Phase-A-	A-	B41	A41	A-	CH3 Phase-A-
CH1 Phase-B+	B+	B40	A40	B+	CH3 Phase-B+
CH1 Phase-B-	B-	B39	A39	B-	CH3 Phase-B-
CH1 Phase-Z+	Z+	B38	A38	Z+	CH3 Phase-Z+
CH1 Phase-Z-	Z-	B37	A37	Z-	CH3 Phase-Z-
CH0 Pulse common	P.COM	B36	A36	P.COM	CH2 Pulse common
CH0 General-purpose input1/Alarm input	IN1/ALM	B35	A35	IN1/ALM	CH2 General-purpose input 1/Alarm input
CH0 General-purpose input2/Positionig input	IN2/INP	B34	A34	IN2/INP	CH2 General-purpose input 2/Positionig input
CH0 General-purpose input3/+ Direction slowdown input	IN3/+SD	B33	A33	IN3/+SD	CH2 General-purpose input 3/+Direction slowdown input
CH0 General-purpose input4/- Direction slowdown input	IN4/-SD	B32	A32	IN4/-SD	CH2 General-purpose input 4/-Direction slowdown input
CH0 General-purpose input 5	IN5	B31	A31	IN5	CH2 General-purpose input 5
CH0 General-purpose input 6	IN6	B30	A30	IN6	CH2 General-purpose input 6
CH0 General-purpose input 7	IN7	B29	A29	IN7	CH2 General-purpose input 7
CH0 Origin input	ORG	B28	A28	ORG	CH2 Origin input
CH0 Positive-direction limit input	+LIM	B27	A27	+LIM	CH2 +Direction limit input
CH0 Vegative-direction limit input	-LIM	B26	A26	-LIM	CH2 -Direction limit input
CH1 Plus common	P.COM	B25	A25	P.COM	CH3 Pulse common
CH1 General-purpose input1/Alarm input	IN1/ALM	B24	A24	IN1/ALM	CH3 General-purpose input 1/*Alarm input
CH1 General-purpose input2/Positioning input	IN2/INP	B23	A23	IN2/INP	CH3 General-purpose input 2/Positioning input
CH1 General-purpose input3/+ Direction slowdown input	IN3/+SD	B22	A22	IN3/+SD	CH3 General-purpose input 3/+Direction slowdown input
CH1 General-purpose input 4/- Direction slowdown input	IN4/-SD	B21	A21	IN4/-SD	CH3 General-purpose input 4/-Direction slowdown input
CH1 General-purpose input 5	IN5	B20	A20	IN5	CH3 General-purpose input 5
CH1 General-purpose input 6	IN6	B19	A19	IN6	CH3 General-purpose input 6
CH1 General-purpose input 7	IN7	B18	A18	IN7	CH3 General-purpose input 7
CH1 Origin input	ORG	B17	A17	ORG	CH3 Origin input
CH1 + Direction limit input	+LIM	B16	A16	+LIM	CH3 +Direction slowdown input
CH1 - Direction limit input	-LIM	B15	A15	-LIM	CH3 -Direction slowdown input
+5V Output	+5V	B14	A14	+5V	+5V Output
+5V Output	+5V	B13	A13	+5V	+5V Output
CH0 General-purpose output3/Counter clear	OUT3/CNTCLR	B12	A12	OUT3/CNTCLR	CH2 General-purpose output 3/counter clear
CH0 General-purpose output2/Alarm clear	OUT2/ALMCLR	B11	A11	OUT2/ALMCLR	CH2 General-purpose output 2/Alarm clear
CH0 General-purpose output1/Hold-off	OUT1/H.OFF	B10	A10	OUT1/H.OFF	CH2 General-purpose output 1/Hold-off
CH0 Direction/CCW Output	DCCW	B09	A09	DCCW	CH2 Direction/CCW Output
CH0 Plus/CW Output	PCW	B08	A08	PCW	CH2 Plus/CW Output
Ground	GND	B07	A07	GND	Ground
CH1 General-purpose output3/Counter clear	OUT3/CNTCLR	B06	A06	OUT3/CNTCLR	CH3 General-purpose output 3/Counter clear
CH1 General-purpose output2/Alarm clear	OUT2/ALMCLR	B05	A05	OUT2/ALMCLR	CH3 General-purpose output 2/Alarm clear
CH1 General-purpose output1/Hold-off	OUT1/H.OFF	B04	A04	OUT1/H.OFF	CH3 General-purpose output 1/Hold-off
CH1 Direction/CCW output	DCCW	B03	A03	DCCW	CH3 Direction/CCW Output
CH1 Plus/CW output	PCW	B02	A02	PCW	CH3 Plus/CW Output
Ground	GND	B01 [96]	A01 [48]	GND	CH3 Ground

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

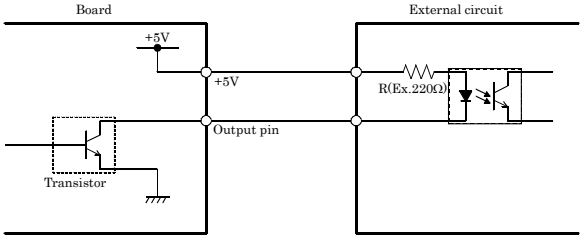
Note!
In the connector on the SMC-2P(PCD), A01 to A48 are N.C. (no connection).

Connecting Output Signals

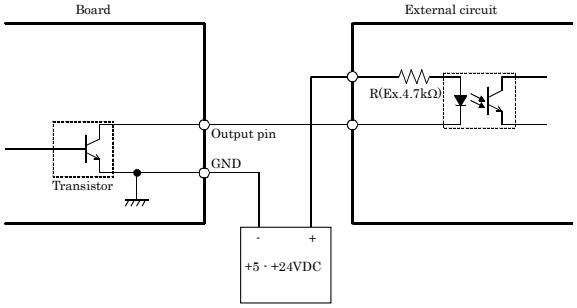
Pulse output/general-purpose output/clear pulse output circuit (PCW, DCCW, OUT1/H.OFF, OUT2/ALMCLR, OUT3/CNTCLR)

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)

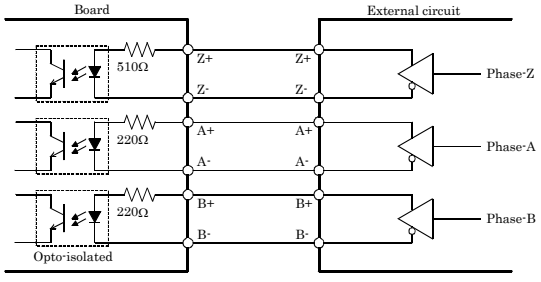


Connecting Input Signals

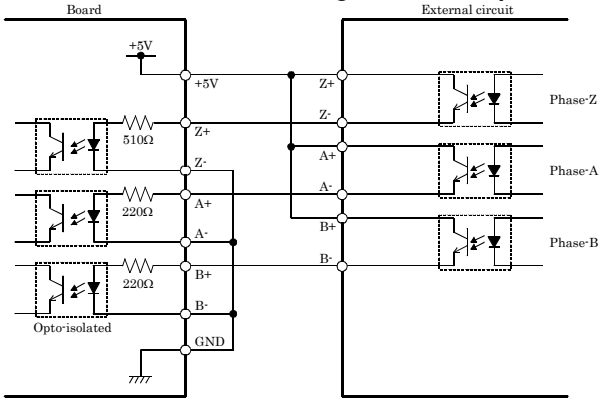
Encoder input circuit

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.

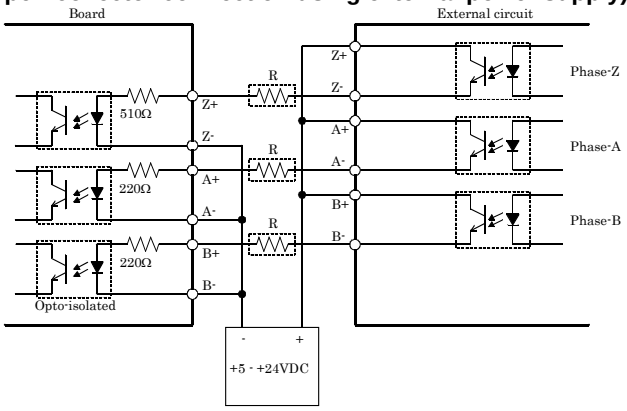
Encoder input circuit (Line driver connection)



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 resister R as shown in the diagram above. The R values are as follows. No R is required when +5 V is used.

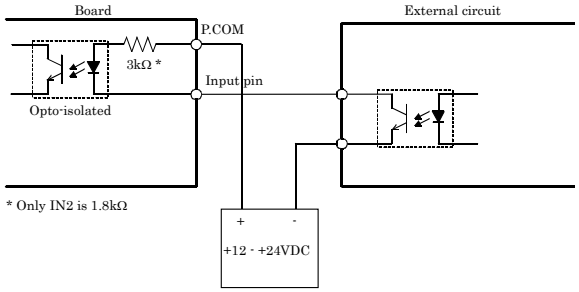
(1) Phase-A, Phase-B
+12V : R = 370 - 680Ω
+24V : R = 1.1k - 1.7kΩ

(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.

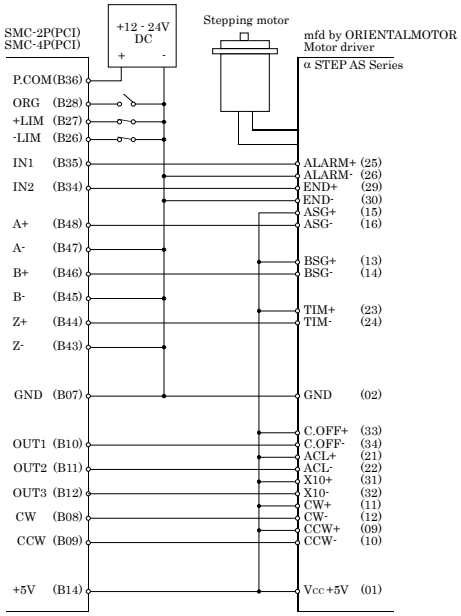
Limit output/general-purpose output/clear pulse output circuit



Connection Examples

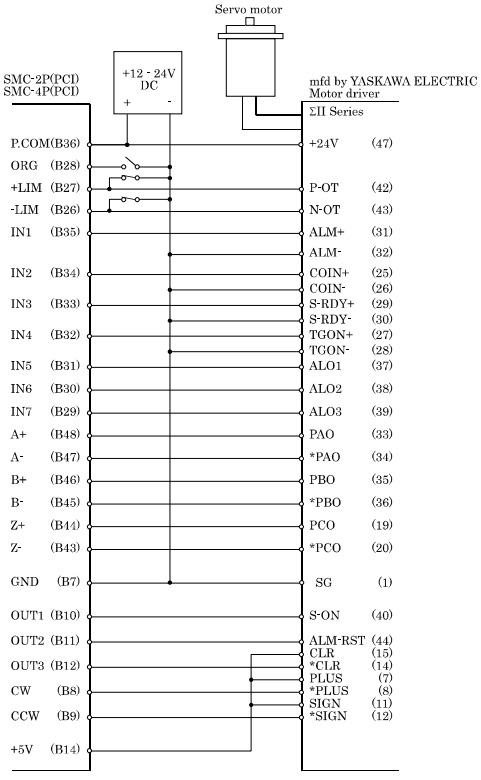
Given below are practical examples of connection of this product that outputs pulses by the independent pulsing method to motor drivers.
These examples show the connections through channel 0.

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.

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