

PCI-compliant
High Speed 4 Axes Motor Controller

SMC-4DL-PCI



PCI-compliant
High Speed 8 Axes Motor Controller

SMC-8DL-PCI



Drive Library [API-PAC]: Included

Accessories

Connection Conversion Board for SMC: CCB-SMC2 *1*2
Screw Terminal (M3*100) : EPD-100A *2

- *1 Distributes 100-pin 0.8-mm pitch connector x 1 to: D-SUB 37 connector x 4, D-SUB-9 connector x 4.
- *2 A PCB100PS optional cable is required separately.

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

Optional Cable & Connector

Shielded Cable With Two 100pin Connector
:PCB100PS-0.5 (0.5m)
:PCB100PS-1.5 (1.5m)
:PCB100PS-3 (3m)
:PCB100PS-5 (5m)

Flat Cable with One 100-Pin Connector
:PCA100P-1.5 (1.5m)
:PCA100P-3 (3m)
:PCA100P-5 (5m)

Packing List

- Board (One of the following)
[SMC-4DL-PCI or SMC-8DL-PCI] ...1
- First step guide ...1

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

These products are PCI bus-standard motion control boards that can position a stepping motor or (a pulse-train input type of) servomotor.

These products have the functions for positioning, origin return, linear interpolation, and for S-curve acceleration and deceleration, capable of multi-axial linear interpolation and speed/position overriding.

These products cover a wide range of applications including semiconductor equipment, test instruments, multi-axis robots, and X-Y robots.

The < SMC-4DL-PCI > can control up to four axes alone.

The < SMC-8DL-PCI > can control up to eight axes alone.

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++.

Features

- Capable of easily controlling the stepping motor and servomotor using software under Windows
- Controlling a larger number of axes
SMC-4DL-PCI : can control up to four axes
SMC-8DL-PCI : can control up to eight axes
- Capable of controlling the jogging at fixed speed or by linear/S-curve acceleration and deceleration, positioning, and origin returning
- Carrying a motor control IC in the PCL6100 series from Nippon Pulse Motor Co., Ltd., capable of controlling jogging, positioning, origin returning, and linear interpolation
- Capable of using an encoder supporting differential output, TTL level output, open-collector output
- Capable of pulse output of up to 9.8 Mpps. Offering a choice of motor control command pulses selectable from among common, 2, and 90-degree phase-shifted pulses
- Capable of speed and position overriding and changing the speed and target position during operation
- Comparator circuits allowing the set value and counter value to be compared
- Pairs of comparator circuits are provided for each axis, allowing the set value and counter value to be compared with each other. They also allow signals to be output while comparator conditions are met.
- Provided with seven general-purpose input pins per axis and three general-purpose output pins
- Seven general-purpose inputs are provided for each axis, five of which are also available as alarm, positioning completion, deceleration stop, counter latch, and positioning start inputs.
- Logic can be changed by software.
- Three output pins are provided for each axis. The output signals can be selected from among the deviation counter clear, comparator condition satisfied state, level signal, and one-shot pulse signals. Logic can be changed by software.
- Dedicated terminal strip CCB-SMC2 (option) available focusing on the ease of use for wiring

Supported Software

Driver Software Package API-PAC(W32) (Included)

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++. 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 included CD-ROM or visit the CONTEC Web site.

< Operating environment >

OS: Windows XP, Server 2003, 2000, etc..

Language: Visual C++ .NET, Visual C# .NET, Visual Basic .NET, Visual Basic, Delphi, C++Builder etc.

Specifications

Common Section

Item	Specification	
	SMC-4DL-PCI	SMC-8DL-PCI
Control target	Stepping motor or servo motor driver unit(pulse train input type)	
Number of axes to control	4 axis	8 axis
Device used	PCL6143 (Nippon Pulse Motor CO., LTD.) or equivalence to it	
Interrupt	1 ch	
Interrupt factor	At the time of stop by positive-direction end limit input ON At the time of stop by negative-direction end limit input ON At the time of stop by alarm input on At the time of stop by simultaneous stop operation At the time of stop by deceleration (decelerated stop) input on At the time of occurring the encoder input error The other event (setting by the software)	
I/O address	Any 128 ports boundary	
Current consumption (Max.)	5VDC 700mA	5VDC 1200mA
Operating condition	0 - 50°C, 10 - 90% (No condensation)	
PCI bus specification	32-bit, 33MHz, Universal key shapes supported *1	
Dimension (mm)	176.41(L) x 106.68(H)	
Connector used	HDRA-EC100LFDT+ [made by HONDA TSUSHIN KOGYO CO., LTD.] or equivalence to it	HDRA-E100W1LFDT1EC-SL+ [made by HONDA TSUSHIN KOGYO CO., LTD.] or equivalence to it
Weight	100g	120g

*1This 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).

Encoder Input Section

Item	Specification
Encode type	Incremental
Maximum counter value	8000000h - 7FFFFFFh(-134,217,728 - 134,217,727), 28 bit
Input signal type	Single-phase input (UP/DOWN/Z) / Phase input(A/B/Z)
Supported output type	Differential output, TTL level output, open-collector output
Device used	AM26LS32(T.I) or equivalence to it
Terminal resistor	150Ω (Separatable with SW)
Receiver input sensitivity	±200mV
In-phase input voltage range	±7V
Distance in which signal can be extended	10m (Depending on the time of connecting the differential output, wiring environment and input frequency) 3m (Depending on the time of connecting the open-collector output, wiring environment and input frequency) 1.5m (Depending on the time of connecting the TTL level output, wiring environment and input frequency)
Response frequency	5MHz duty 50% (differential output), 3MHz duty 50% (TTL level output), 1MHz duty 50% (open-collector output)

Limit Input section

Item	Specification
Signal channel	3ch/axis (original point, Forward limit, reserve limit)
Input signal name	ORG : origin input +LIM : positive direction end limit input -LIM : negative direction end limit input
Input logic	Enables selecting the positive/negative logic by using the Software
Input type	Opto-isolated input (corresponding to current sink output)
Response time (Max.)	200 μ sec
Input resistance	4.7k Ω
Input ON current	2.0mA or more
Input OFF current	0.16mA or less
External circuit power supply	12V - 24VDC(\pm 10%)

General-purpose Input Section

Item	Specification
Signal channel	7ch/axis
Input signal name	IN1/ALM : alarm input, general-purpose input IN2/INP:positioning completion input, general-purpose input IN3/SD:deceleration (decelerated stop) input, general-purpose input IN4/LTC : counter latch input, general-purpose input IN5/PCS:positioning control start input, 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	Opto-coupler input (corresponding to current sink output)
Response time (Max.)	200 μ sec
Input resistance	4.7k Ω
Input ON current	2.0mA or more
Input OFF current	0.16mA or less
External circuit power supply	12V - 24VDC(\pm 10%)

Pulse Output Section

Item	Specification
Pulse rate	0.3 - 9.8 Mpps
Output signal name	CW : pulse / CW output CCW : direction / CCW output
Output signal system	2 Pulse types (pulse for positive/negative direction) or the common pulse type (pulse signal/directional signal)
Output form	Un-isolated differential line driver output
Device used	AM26LS31(T.I) or equivalence to it

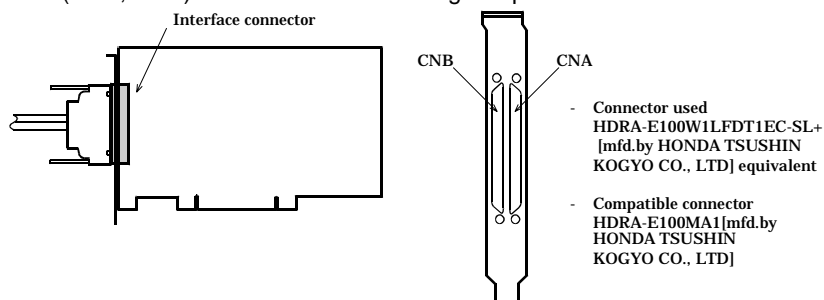
General-purpose Output Section

Item	Specification
Number of signal channel	3ch/axis
Output signal name	OUT1 : general-purpose output OUT2 : general-purpose output OUT3 : general-purpose output ALMCLR : alarm clear output ERC : driver differential clear output CP1 : comparator1 output CP2 : comparator2 output
Signal specification	Un-isolated open collector output (current sink type) (Enables selecting the positive/negative logic by using the Software)
Response time (Max.)	10 μ sec (when using the loading on the input side 510 Ω , +24VDC)
Rated output current (Max.)	100mA per 1ch, 300mA per 1 axis
Rated output withstanding voltage (Max.)	50VDC

How to Connect the On-board connector (1/3)

< SMC-8DL-PCI >

The on-board interface connector (CAN, CNB) is used when connecting this product and the external devices.

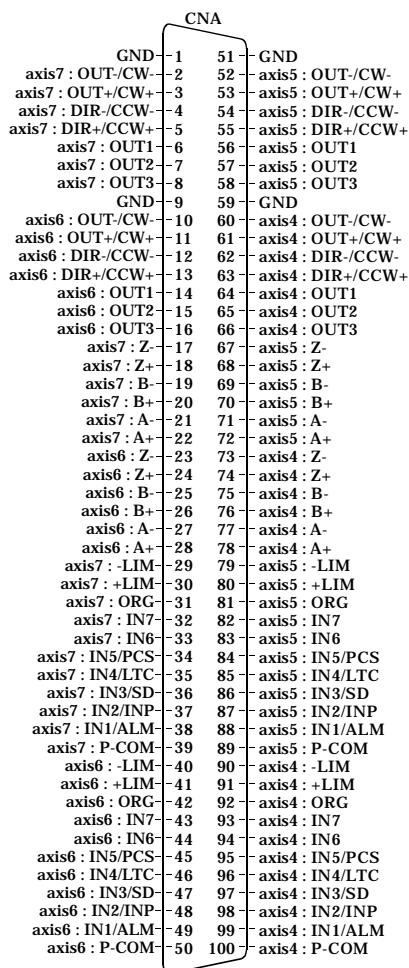


Pin Assignments of Interface Connector (CNA, CNB)

CNB	
axis0 : P-COM	100
axis0 : IN1/ALM	99
axis0 : IN2/INP	98
axis0 : IN3/SD	97
axis0 : IN4/LTC	96
axis0 : IN5/PCS	95
axis0 : IN6	94
axis0 : IN7	93
axis0 : ORG	92
axis0 : +LIM	91
axis0 : -LIM	90
axis1 : P-COM	89
axis1 : IN1/ALM	88
axis1 : IN2/INP	87
axis1 : IN3/SD	86
axis1 : IN4/LTC	85
axis1 : IN5/PCS	84
axis1 : IN6	83
axis1 : IN7	82
axis1 : ORG	81
axis1 : +LIM	80
axis1 : -LIM	79
axis0 : A+	78
axis0 : A-	77
axis0 : B+	76
axis0 : B-	75
axis0 : Z+	74
axis0 : Z-	73
axis1 : A+	72
axis1 : A-	71
axis1 : B+	70
axis1 : B-	69
axis1 : Z+	68
axis1 : Z-	67
axis0 : OUT3	66
axis0 : OUT2	65
axis0 : OUT1	64
axis0 : DIR+/CCW+	63
axis0 : DIR-/CCW-	62
axis0 : OUT+/CW+	61
axis0 : OUT-/CW-	60
GND	59
axis1 : OUT3	58
axis1 : OUT2	57
axis1 : OUT1	56
axis1 : DIR+/CCW+	55
axis1 : DIR-/CCW-	54
axis1 : OUT+/CW+	53
axis1 : OUT-/CW-	52
GND	51
axis2 : P-COM	50
axis2 : IN1/ALM	49
axis2 : IN2/INP	48
axis2 : IN3/SD	47
axis2 : IN4/LTC	46
axis2 : IN5/PCS	45
axis2 : IN6	44
axis2 : IN7	43
axis2 : ORG	42
axis2 : +LIM	41
axis2 : -LIM	40
axis3 : P-COM	39
axis3 : IN1/ALM	38
axis3 : IN2/INP	37
axis3 : IN3/SD	36
axis3 : IN4/LTC	35
axis3 : IN5/PCS	34
axis3 : IN6	33
axis3 : IN7	32
axis3 : ORG	31
axis3 : +LIM	30
axis3 : -LIM	29
axis2 : A+	28
axis2 : A-	27
axis2 : B+	26
axis2 : B-	25
axis2 : Z+	24
axis2 : Z-	23
axis3 : A+	22
axis3 : A-	21
axis3 : B+	20
axis3 : B-	19
axis3 : Z+	18
axis3 : Z-	17
axis2 : OUT3	16
axis2 : OUT2	15
axis2 : OUT1	14
axis2 : DIR+/CCW+	13
axis2 : DIR-/CCW-	12
axis2 : OUT+/CW+	11
axis2 : OUT-/CW-	10
GND	9
axis3 : OUT3	8
axis3 : OUT2	7
axis3 : OUT1	6
axis3 : DIR+/CCW+	5
axis3 : DIR-/CCW-	4
axis3 : OUT+/CW+	3
axis3 : OUT-/CW-	2
GND	1

P-COM	Plus common	B+	Encoder phaseB input+
IN1/ALM	General-purpose input1/Alarm input	B-	Encoder phaseB input-
IN2/INP	General-purpose input2/Positionig input	Z+	Encoder phaseZ input+
IN3/SD	General-purpose input3/Slow down input	Z-	Encoder phaseZ input-
IN4/LTC	General-purpose input4/counter latch input	OUT1	General-purpose output1
IN5/PCS	General-purpose input5/positioning operation start input	OUT2	General-purpose output2
IN6	General-purpose input6	OUT3	General-purpose output3
IN7	General-purpose input7	DIR+/CCW+	Direction/CCW output+
ORG	Origin input	DIR-/CCW-	Direction/CCW output-
+LIM	Positive-direction limit	OUT+/CW+	Pulse/CW output+
-LIM	Negative-direction limit	OUT-/CW-	Pulse/CW output-
A+	Encoder phaseA input+	GND	Power ground input (common to internal GND)
A-	Encoder phaseA input-		

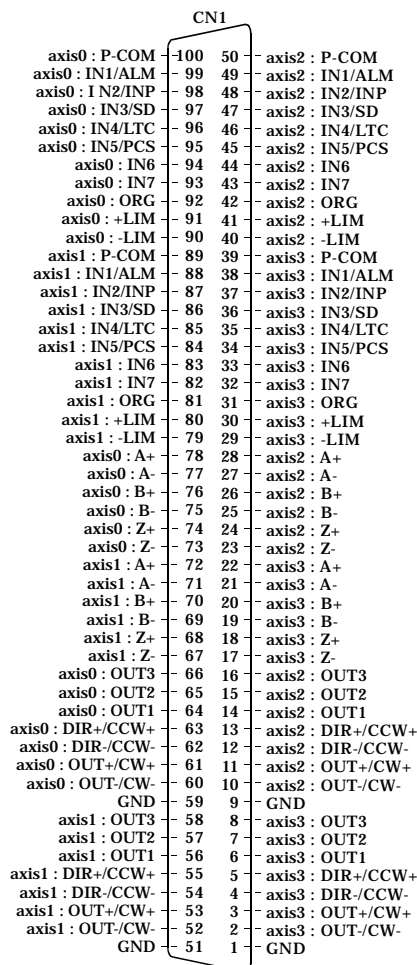
How to Connect the On-board connector (2/3)



P-COM	Plus common	B+	Encoder phaseB input+
IN1/ALM	General-purpose input1/Alarm input	B-	Encoder phaseB input-
IN2/INP	General-purpose input2/Positionig input	Z+	Encoder phaseZ input+
IN3/SD	General-purpose input3/Slow down input	Z-	Encoder phaseZ input-
IN4/LTC	General-purpose input4/counter latch input	OUT1	General-purpose output1
IN5/PCS	General-purpose input5/positioning operation start input	OUT2	General-purpose output2
IN6	General-purpose input6	OUT3	General-purpose output3
IN7	General-purpose input7	DIR+/CCW+	Direction/CCW output+
ORG	Origin input	DIR-/CCW-	Direction/CCW output-
+LIM	Positive-direction limit	OUT+/CW+	Pulse/CW output+
-LIM	Negative-direction limit	OUT-/CW-	Pulse/CW output-
A+	Encoder phaseA input+	GND	Power ground input (common to internal GND)
A-	Encoder phaseA input-		

How to Connect the On-board connector (3/3)

< SMC-4DL-PCI >



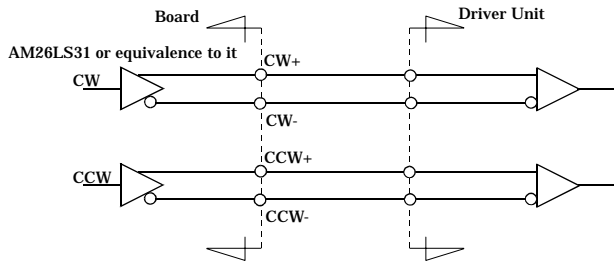
P-COM	Plus common	B+	Encoder phaseB input+
IN1/ALM	General-purpose input1/Alarm input	B-	Encoder phaseB input-
IN2/INP	General-purpose input2/Positionig input	Z+	Encoder phaseZ input+
IN3/SD	General-purpose input3/Slow down input	Z-	Encoder phaseZ input-
IN4/LTC	General-purpose input4/counter latch input	OUT1	General-purpose output1
IN5/PCS	General-purpose input5/positioning operation start input	OUT2	General-purpose output2
IN6	General-purpose input6	OUT3	General-purpose output3
IN7	General-purpose input7	DIR+/CCW+	Direction/CCW output+
ORG	Origin input	DIR-/CCW-	Direction/CCW output-
+LIM	Positive-direction limit	OUT+/CW+	Pulse/CW output+
-LIM	Negative-direction limit	OUT-/CW-	Pulse/CW output-
A+	Encoder phaseA input+	GND	Power ground input (common to internal GND)
A-	Encoder phaseA input-		

How to Connect Output signal connection

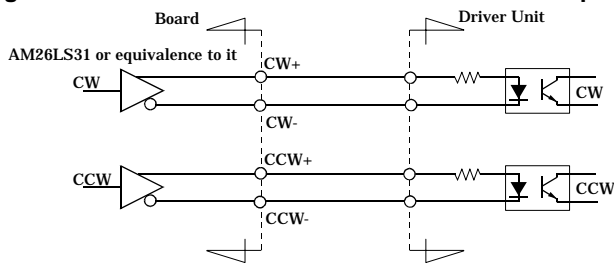
Pulse output circuit (CW, CCW)

Pulse output circuit on this product is illustrated below. The signal output is a differential line-driver output.

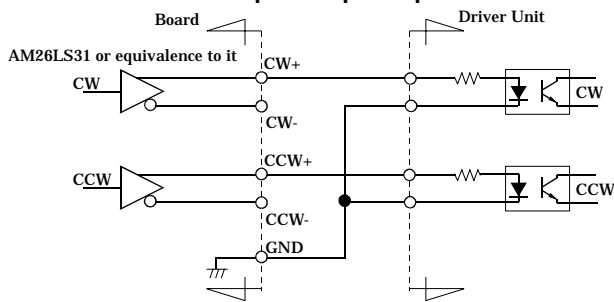
Connection with the differential input



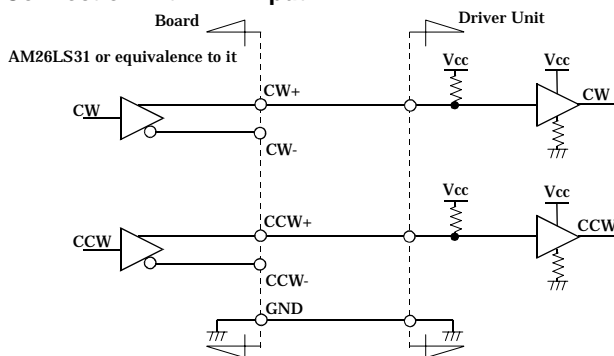
Connection with the opto-coupler input (When the driver unit guarantees the connection with the differential output)



Connection with the opto-coupler input



Connection with TTL input

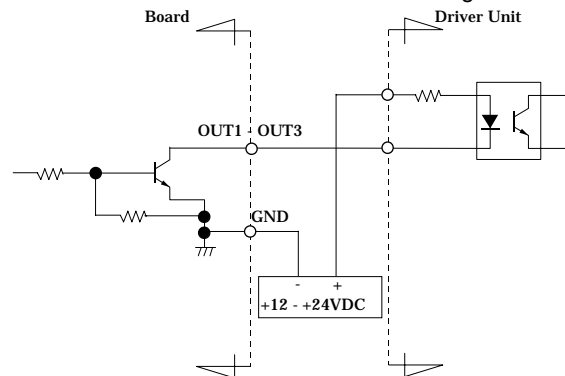


⚠ CAUTION

- When connecting with the photo-coupler input or the TTL input, check the specification for the driver unit beforehand.
- To prevent the circuit from malfunctioning due to noise, wire it as far away from other signal lines and noise sources as possible.

Control signal/general-purpose signal output circuit (OUT1 - OUT3, ERC, CP1, CP2)

Output circuit of each output signal on this product is illustrated below. The signal output is an open-collector output. A ground wire must therefore be connected for driving.

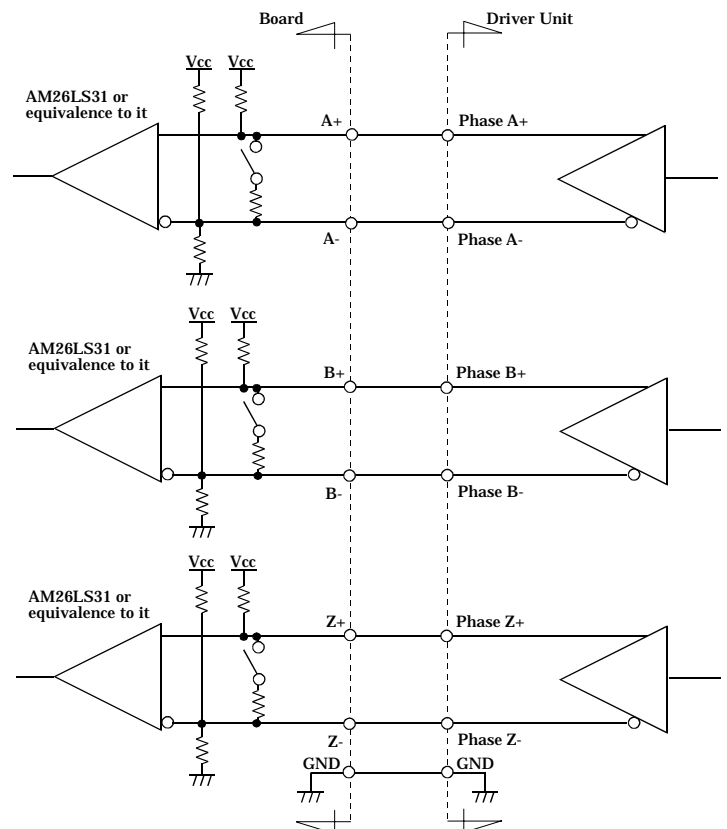


How to Connect Input signal connection (1/2)

Encoder input circuit

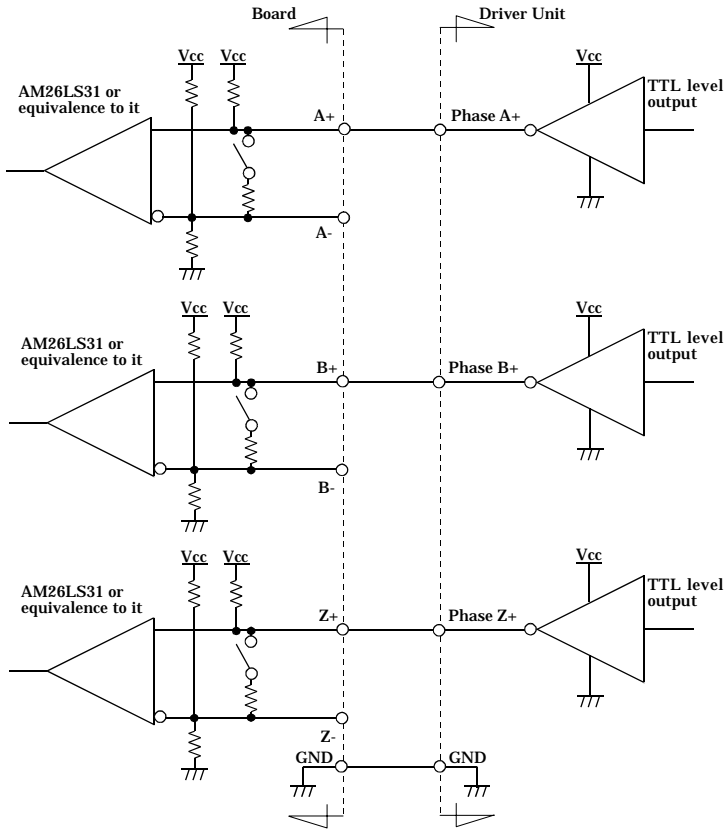
Encoder input circuit on this product is illustrated below. The signal input is a differential input capable of connecting a line driver output, TTL level output and open-collector output.

Connection with the differential output

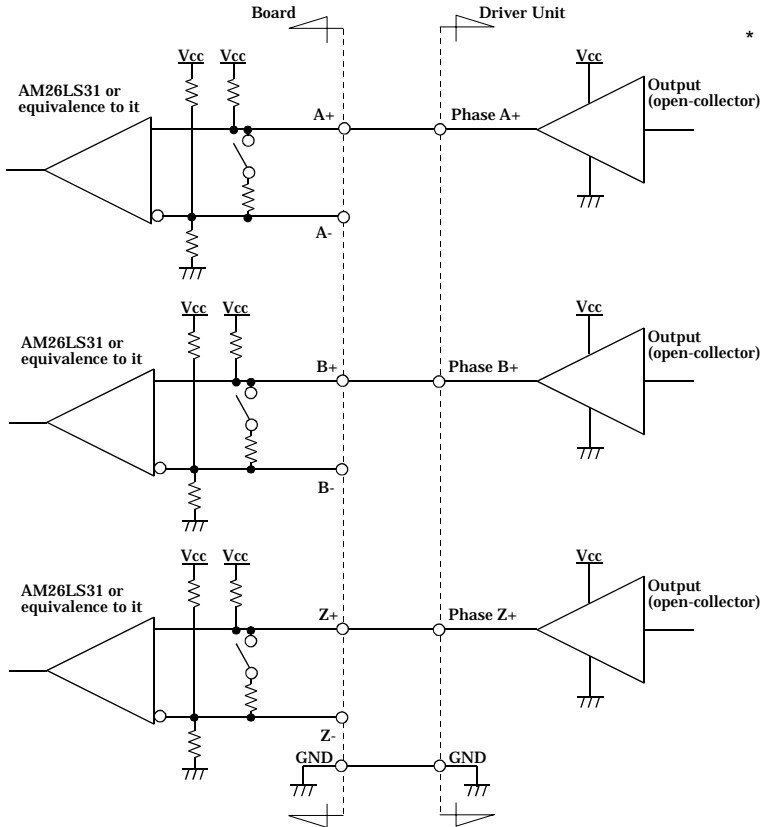


How to Connect Input signal connection (2/2)

Connection with the TTL level output



Connection with the open-collector output

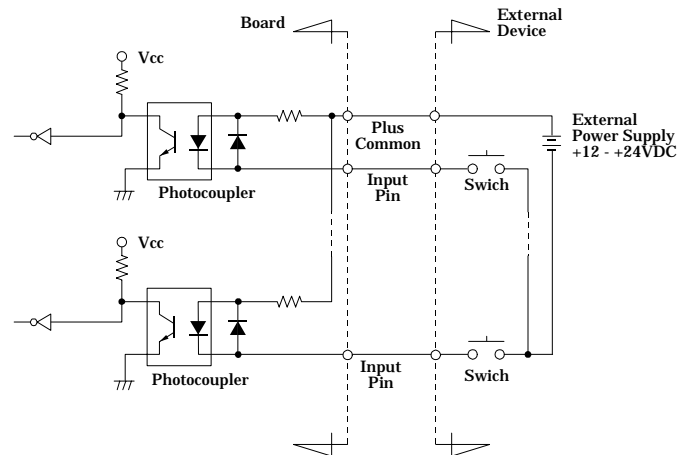


⚠ CAUTION

- Do not insert a terminator when you connect TTL level output signals or open-collector output signals. Otherwise, this product may malfunction, overheat, or cause a failure.
- Restrict the use of cables to 10m for the line driver output, 3m for the open-collector output, and 1.5m for the TTL level output.
- To prevent the circuit from malfunctioning due to noise, wire it as far away from other signal lines and noise sources as possible.

Limit input/general-purpose input/control input 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 (sink type). To drive the limit input/general-purpose input/control input block, therefore, an external power supply is required at +12 - +24 V.

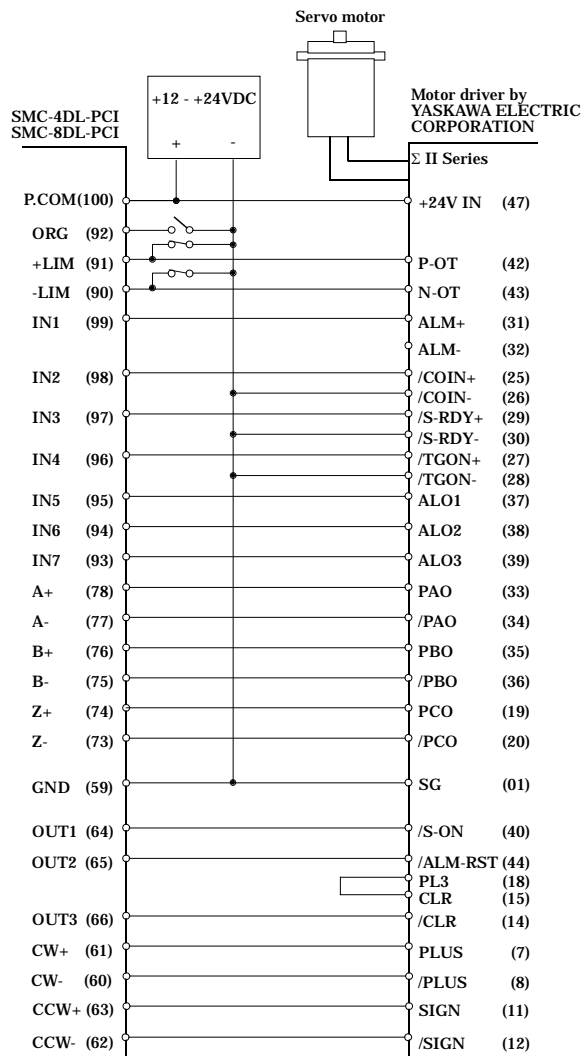


* Input pin is IN1 - IN7, +LIM, -LIM, ORG.

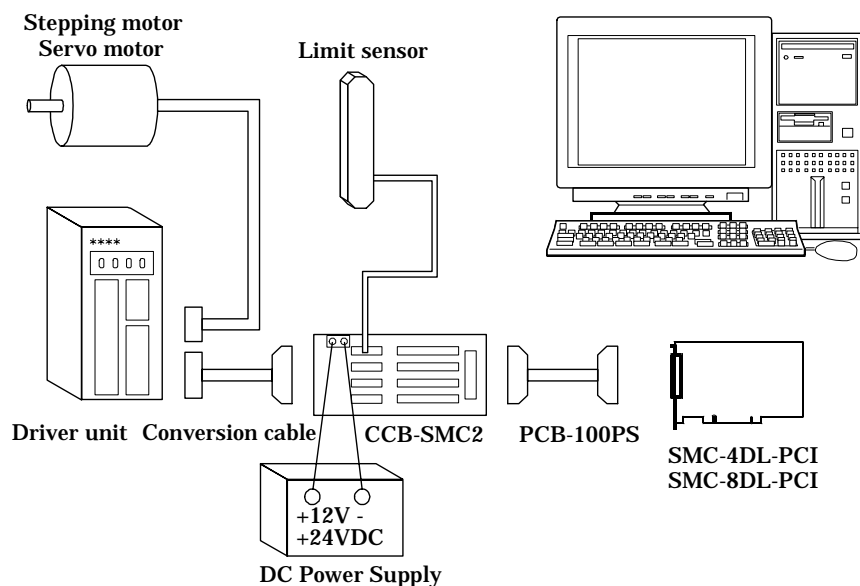
Connection Examples

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 axis0.

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



System configuration Examples



Component features

Item	Description
SMC-4DL-PCI SMC-8DL-PCI	When installed on the PC, this board generates pulses required for position control.
PCB-100PS (Option)	This cable connects the board to the CCB-SMC2.
CCB-SMC2 (Option)	This screw terminal is used to efficiently connect the devices (the board, driver unit, DC power supply, limit sensor) required for position control. The screw terminal can connect a four-axis motion control system alone.
Conversion cable	The shape of the control connector of each driver unit is largely different depending on the manufacturer and type. A conversion cable must be prepared to connect each driver unit to the CCB-SMC2.
Driver unit Stepping motor / Servo motor	Motor and driver unit to be subject to motion control. Available in various types by motor capacity, power-supply voltage, and motor shape. Select the ones that best fit your needs.
Limit sensor	This sensor is installed at the forward/backward limit and origin detection positions. When a table is used in the system, the sensor is bundled with the table. For a self-made system, use commercially available switches.
DC Power supply	Power supply to the CCB-SMC2. Use a 12 - 24-VDC power supply.

Block Diagram

