

PC-HELPER

High-Speed Motor Control Board for PCI
2axes

SMC-2P(PCI)

4axes

SMC-4P(PCI)

User's Guide

CONTEC CO.,LTD.

Check Your Package

Thank you for purchasing the CONTEC product.

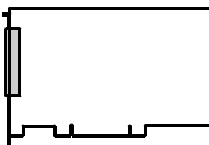
The product consists of the items listed below.

Check, with the following list, that your package is complete. If you discover damaged or missing items, contact your retailer.

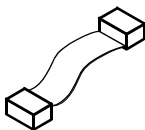
Product Configuration List

- Board (One of the following)
[SMC-2P(PCI) or 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 (this guide)



Board



Synchronization control cable



First step guide



CD-ROM
[API-PAC(W32)]

Copyright

Copyright 2002 CONTEC CO., LTD. ALL RIGHTS RESERVED

No part of this document may be copied or reproduced in any form by any means without prior written consent of CONTEC CO., LTD.

CONTEC CO., LTD. makes no commitment to update or keep current the information contained in this document. The information in this document is subject to change without notice.

All relevant issues have been considered in the preparation of this document. Should you notice an omission or any questionable item in this document, please feel free to notify CONTEC CO., LTD.

Regardless of the foregoing statement, CONTEC assumes no responsibility for any errors that may appear in this document or for results obtained by the user as a result of using this product.

Trademarks

MS, Microsoft, Windows and Windows NT are trademarks of Microsoft Corporation. Other brand and product names are trademarks of their respective holder.

Table of Contents

Check Your Package	i
Copyright	ii
Trademarks	ii
Table of Contents	iii

1. BEFORE USING THE PRODUCT

1

About the Board	1
Features.....	1
Support Software.....	2
Cable & Connector (Option)	3
Accessories (Option).....	4
Customer Support.....	5
Web Site	5
Limited Three-Years Warranty.....	5
How to Obtain Service	5
Liability	5
Safety Precautions	6
Safety Information	6
Handling Precautions	7
Environment	8
Inspection	8
Storage.....	8
Disposal	8

2. SETUP

9

What is Setup?.....	9
Using the Board under Windows Using the Driver library API-PAC(W32)	9
Using the Board under Window Using Software Other than the Driver library API-PAC(W32)	9
Using the Board under an OS Other than Windows	10
Step 1 Installing the Software.....	11
Starting the Install Program	11
Select API-SMC(98/PC).....	12
Executing the Installation	13
Step 2 Setting the Hardware	14
Parts of the Board and Factory Defaults	14
Setting the Board ID	15
Plugging the Board.....	16

Step 3 Installing the Hardware.....	17
Turning on the PC	17
Setting with the Found New Hardware Wizard	17
Step 4 Initializing the Software.....	20
Invoking API-TOOL Configuration	20
Updating the Settings	20
Starting the SMC Initial Setup Utility	21
Step 5 Checking Operations with the Diagnosis Program	23
What is the Diagnosis Program?	23
Check method	23
Using the Diagnosis Program.....	25
Setup Troubleshooting.....	28
Symptoms and Actions.....	28
If your problem cannot be resolved	28

3.	EXTERNAL CONNECTION	29
-----------	----------------------------	-----------

Using the On-board Connectors.....	29
Connecting a Device to a Connector	29
Connector Pin Assignment.....	30
Connecting Output Signals.....	31
Pulse output/general-purpose output/clear pulse output circuit (PCW, DCCW, OUT1/H.OFF, OUT2/ALMCLR, OUT3/CNTCLR).....	31
Connecting Input Signals	32
Encoder input circuit	32
Limit output/general-purpose output/clear pulse output circuit (IN1 - IN7, +LIM, -LIM, ORG).....	34
Connection Examples	35
Surge Voltage Countermeasures	37
About a protection function.....	38

4.	FUNCTIONS	39
	About each motor control operation	39
	PTP operation function	39
	JOG operation function	39
	ORG operation function	39
	Frame (bank) sequence operation function	39
	Synchronous control function	40
	S-curve acceleration/deceleration function	40
	Meanings of signals	41
	Limit input signals	41
	Encoder input signal	42
	Pulse output signal	42
	General-purpose input signals	43
	P.COM(Plus common signal)	44
	GND(Ground)	44
	+5V(+5V Output)	44
	Connecting the synchronization control connectors	45
	Motion control system	46
	System configuration	46
	Signal correspondence between the board and driver unit	47
5.	ABOUT SOFTWARE	49
	CD-ROM Directory Structure	49
	About Software for Windows	50
	Accessing the Help File	50
	Using Sample Programs	51
	Uninstalling the Driver library	53
6.	ABOUT HARDWARE	55
	For detailed technical information	55
	Hardware specification	55
	Block Diagram	59

1. Before Using the Product

This chapter provides information you should know before using the product.

About the Board

The SMC-2P(PCI) or SMC-4P(PCI) 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++.

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.

Support Software

You should use CONTEC support software according to your purpose and development environment.

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++.

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, 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..

Cable & Connector (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)

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 (Option)

Connection Conversion Board for SMC-P Series : CCB-SMC1 *1

Screw Terminal : 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.

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

Customer Support

CONTEC provides the following support services for you to use CONTEC products more efficiently and comfortably.

Web Site

Japanese <http://www.contec.co.jp/>

English <http://www.contec.com/>

Chinese <http://www.contec.com.cn/>

Latest product information

CONTEC provides up-to-date information on products.

CONTEC also provides product manuals and various technical documents in the PDF.

Free download

You can download updated driver software and differential files as well as sample programs available in several languages.

Note! For product information

Contact your retailer if you have any technical question about a CONTEC product or need its price, delivery time, or estimate information.

Limited Three-Years Warranty

CONTEC Interface boards are warranted by CONTEC CO., LTD. to be free from defects in material and workmanship for up to three years from the date of purchase by the original purchaser.

Repair will be free of charge only when this device is returned freight prepaid with a copy of the original invoice and a Return Merchandise Authorization to the distributor or the CONTEC group office, from which it was purchased.

This warranty is not applicable for scratches or normal wear, but only for the electronic circuitry and original boards. The warranty is not applicable if the device has been tampered with or damaged through abuse, mistreatment, neglect, or unreasonable use, or if the original invoice is not included, in which case repairs will be considered beyond the warranty policy.

How to Obtain Service

For replacement or repair, return the device freight prepaid, with a copy of the original invoice. Please obtain a Return Merchandise Authorization Number (RMA) from the CONTEC group office where you purchased before returning any product.

* No product will be accepted by CONTEC group without the RMA number.

Liability




The obligation of the warrantor is solely to repair or replace the product. In no event will the warrantor be liable for any incidental or consequential damages due to such defect or consequences that arise from inexperienced usage, misuse, or malfunction of this device.

Safety Precautions

Understand the following definitions and precautions to use the product safely.

Safety Information

This document provides safety information using the following symbols to prevent accidents resulting in injury or death and the destruction of equipment and resources. Understand the meanings of these labels to operate the equipment safely.

 DANGER	DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

Handling Precautions

DANGER

Do not use the product where it is exposed to flammable or corrosive gas. Doing so may result in an explosion, fire, electric shock, or failure.

CAUTION

- There are switches on the board that need to be set in advance. Be sure to check these before installing the board.
 - Only set the switches and jumpers on the board to the specified settings. Otherwise, the board may malfunction, overheat, or cause a failure.
 - Do not strike or bend the board. Doing so could damage the board. Otherwise, the board may malfunction, overheat, cause a failure or breakage.
 - Do not touch the board's metal plated terminals (edge connector) with your hands. Otherwise, the board may malfunction, overheat, or cause a failure. If the terminals are touched by someone's hands, clean the terminals with industrial alcohol.
 - Do not install or remove the board to or from the slot while the computer's power is turned on. Otherwise, the board may malfunction, overheat, or cause a failure. Doing so could cause trouble. Be sure that the personal computer or the I/O expansion unit power is turned off.
 - Make sure that your PC or expansion unit can supply ample power to all the boards installed. Insufficiently energized boards could malfunction, overheat, or cause a failure.
 - The specifications of this product are subject to change without notice for enhancement and quality improvement. Even when using the product continuously, be sure to read the manual and understand the contents.
 - Do not modify the product. CONTEC will bear no responsibility for any problems, etc., resulting from modifying this product.
 - Regardless of the foregoing statements, CONTEC is not liable for any damages whatsoever (including damages for loss of business profits) arising out of the use or inability to use this CONTEC product or the information contained herein.
-

Environment

Use this product in the following environment. If used in an unauthorized environment, the board may overheat, malfunction, or cause a failure.

Operating temperature

0 - 50°C

Humidity

10 - 90%RH (No condensation)

Corrosive gases

None

Floating dust particles

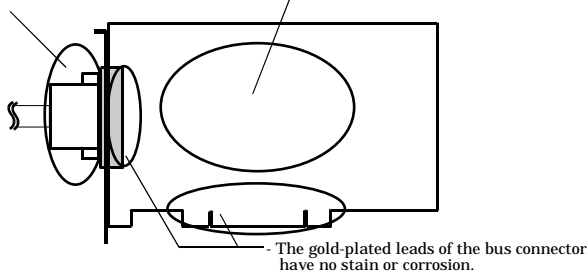
Not to be excessive

Inspection

Inspect the product periodically as follows to use it safely.

- Check that the bus connector of the board and its cable have been plugged correctly.

- Check that the board has no dust or foreign matter adhering.



Storage

When storing this product, keep it in its original packing form.

- (1) Put the board in the storage bag.
- (2) Wrap it in the packing material, then put it in the box.
- (3) Store the package at room temperature at a place free from direct sunlight, moisture, shock, vibration, magnetism, and static electricity.

Disposal

When disposing of the product, follow the disposal procedures stipulated under the relevant laws and municipal ordinances.

2. Setup

This chapter explains how to set up the board.

What is Setup?

Setup means a series of steps to take before the product can be used.

Different steps are required for software and hardware

The setup procedure varies with the OS and applications used.

Using the Board under Windows

Using the Driver library API-PAC(W32)

This section describes the setup procedure to be performed before you can start developing application programs for the board using the bundled CD-ROM “Driver library API-PAC(W32)”.

Taking the following steps sets up the software and hardware. You can use the diagnosis program later to check whether the software and hardware function normally.

Step 1 Installing the Software

Step 2 Setting the Hardware

Step 3 Installing the Hardware

Step 4 Initializing the Software

Step 5 Checking Operations with the Diagnosis Program

If Setup fails to be performed normally, see the “Setup Troubleshooting” section at the end of this chapter.

Using the Board under Window

Using Software Other than the Driver library

API-PAC(W32)

For setting up software other than API-PAC(W32), refer to the manual for that software. See also the following parts of this manual as required.

This chapter Step 2 Setting the Hardware

This chapter Step 3 Installing the Hardware

Chapter 3 External Connection

Chapter 6 About Hardware

Using the Board under an OS Other than Windows

For using the board under an OS other than Windows, see the following parts of this manual.

This chapter Step 2 Setting the Hardware

Chapter 3 External Connection

Chapter 6 About Hardware

Step 1 Installing the Software

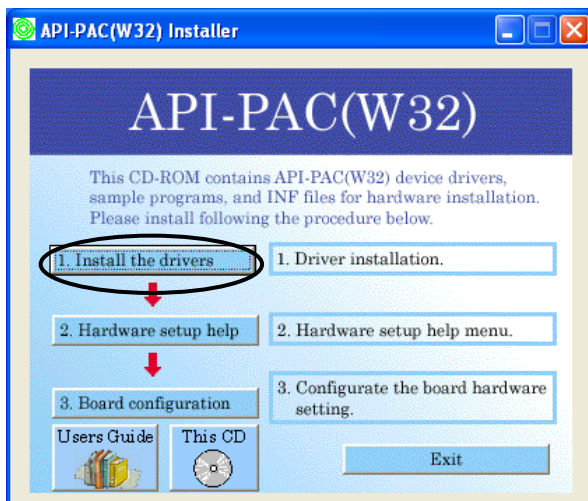
This section describes how to install the API function libraries.

Before installing the hardware on your PC, install the API driver libraries from the bundled API-PAC(W32) CD-ROM.

The following description assumes the operating system as Windows XP. Although some user interfaces are different depending on the OS used, the basic procedure is the same.

Starting the Install Program

- (1) Load the CD-ROM [API-PAC(W32)] on your PC.
- (2) The API-PAC(W32) Installer window appears automatically.
If the panel does not appear, run (CD-ROM drive letter):\AUTORUN.exe.
- (3) Click on the [Install the drivers] button.

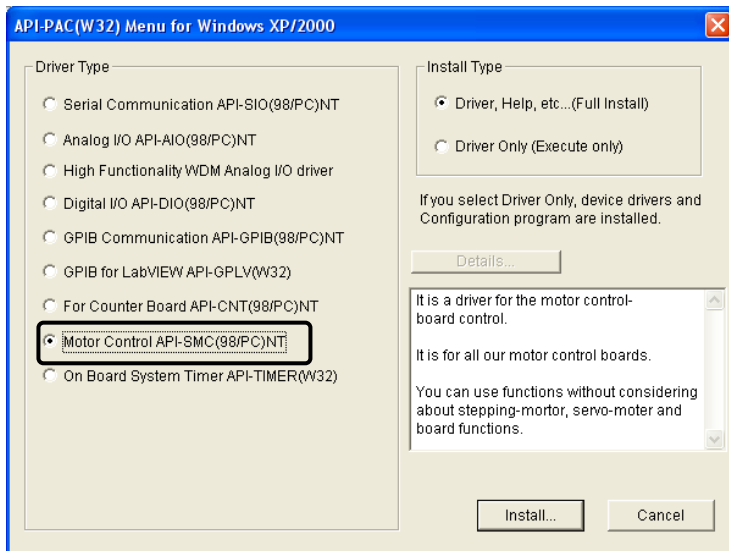


CAUTION

Before installing the software in Windows XP, 2000, log in as a user with administrator privileges.

Select API-SMC(98/PC)

- (1) The following dialog box appears to select “Driver Type” and “Install Type”.
- (2) Select “Motor Control API-SMC(98/PC)NT”.
- (3) Select “Driver, Help, etc..(Full Install)”.
- (4) Click on the [Install] button.



Executing the Installation

- (1) Follow the on-screen instructions to proceed to install.
- (2) When the required files have been copied, the “Perform a hardware setup now” and “Show readme file” check boxes are displayed.

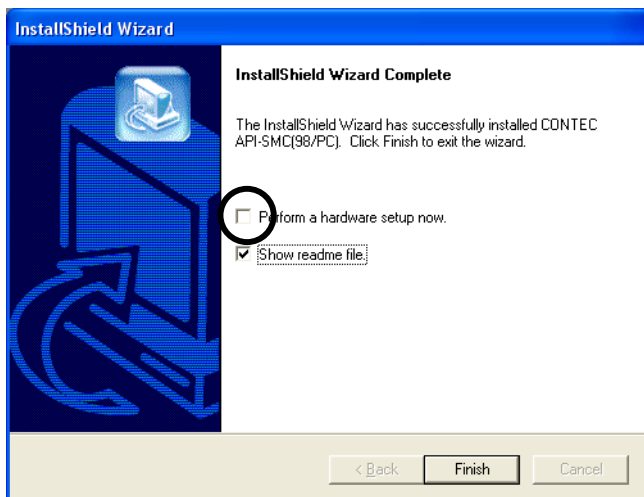
When you are installing the software or hardware for the first time:

1) Uncheck “Perform a hardware setup now”.

2) Click on the [Finish] button. Go to Step 2 to set and plug the hardware.

* When the hardware has already been installed:

Check “Perform a hardware setup now”, then go to Step 4 “Initializing the Software”.



You have now finished installing the software.

Step 2 Setting the Hardware

This section describes how to set the board and plug it on your PC.

The board has some switches and jumper to be preset.

Check the on-board switches and jumpers before plugging the board into an expansion slot.

The board can be set up even with the factory defaults untouched. You can change board settings later.

Parts of the Board and Factory Defaults

Figure 2.1. shows the names of major parts on the board.

Note that the switch setting shown below is the factory default.

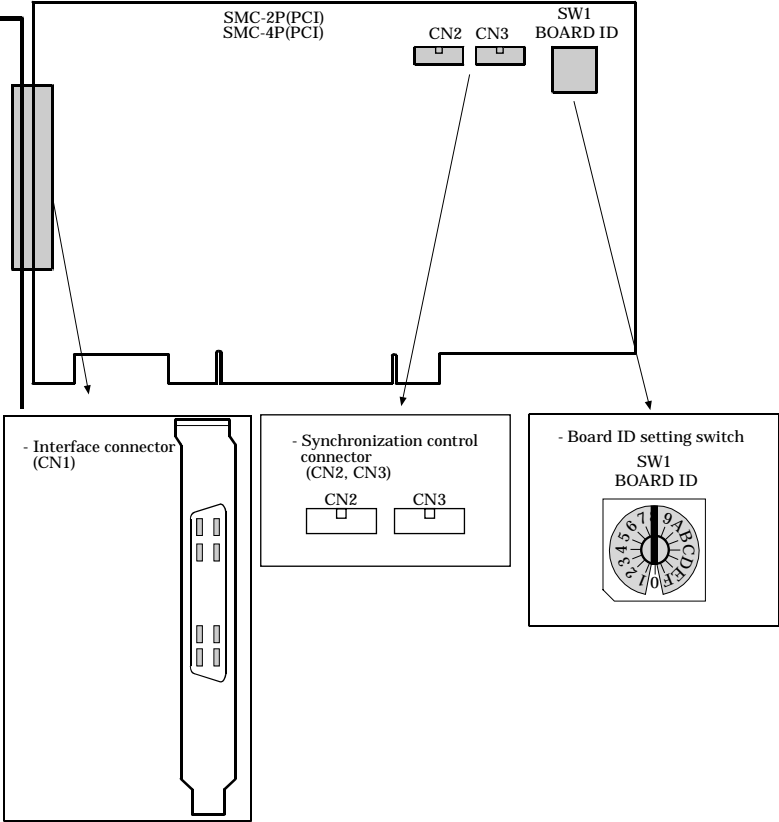


Figure 2.1. Component Locations

Setting the Board ID

If you install two or more boards on one personal computer, assign a different ID value to each of the boards to distinguish them.

The board IDs can be set from 0 - Fh to identify up to sixteen boards.

If only one board is used, the original factory setting (Board ID = 0) should be used.

Setting Procedure

To set the board ID, use the rotary switch on the board. Turn the SW1 knob to set the board ID as shown below.

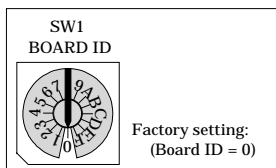


Figure 2.2. Board ID Settings (SW1)

Plugging the Board

- (1) Before plugging the board, shut down the system, unplug the power code of your PC.
- (2) Remove the cover from the PC so that the board can be mounted.
- (3) Plug the board into an expansion slot.
- (4) Fasten the board bracket to the PC's chassis with the removed screw.
- (5) Put the cover back into place.



Applicable PCI bus slots

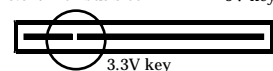
PCI bus slots used in PCs have keys to prevent 5V and 3.3V PCI bus boards from being accidentally plugged into wrong bus slots. This board can be plugged into both of the 5V and 3.3V PCI bus slots.

<PCI bus slot>

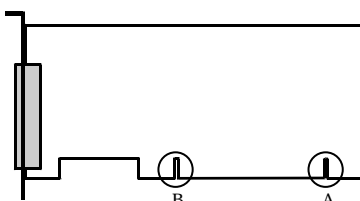
5-V PCI bus slot



3.3-V PCI bus slot



<PCI bus board>



A : Slit for 5-V PCI bus slot
B : Slit for 3.3-V PCI bus slot

⚠ CAUTION

- Do not touch the board's metal plated terminals (edge connector) with your hands. Otherwise, the board may malfunction, overheat, or cause a failure.
If the terminals are touched by someone's hands, clean the terminals with industrial alcohol.
- Do not install or remove the board to or from the slot while the computer's power is turned on. Otherwise, the board may malfunction, overheat, or cause a failure.
Doing so could cause trouble. Be sure that the personal computer or the I/O expansion unit power is turned off.
- Make sure that your PC or expansion unit can supply ample power to all the boards installed.
Insufficiently energized boards could malfunction, overheat, or cause a failure.
- Power supply from the PCI bus slot at +5V is required.

Step 3 Installing the Hardware

For using an expansion board under Windows, you have to let the OS detect the I/O addresses and IRQ to be used by the board. The process is referred to as installing the hardware.

In the case of using two or more boards, make sure you install one by one with the Add New Hardware Wizard.

Turning on the PC

Turn on the power to your PC.



CAUTION

- The board cannot be properly installed unless the resources (I/O addresses and interrupt level) for the board can be allocated. Before attempting to install the board, first determine what PC resources are free to use.
- The resources used by each board do not depend on the location of the PCI bus slot or the board itself. If you remove two or more boards that have already been installed and then remount one of them on the computer, it is unknown that which one of the sets of resources previously assigned to the two boards is assigned to the remounted board. In this case, you must check the resource settings.

Setting with the Found New Hardware Wizard

- (1) The “Found New Hardware Wizard” will be started.

Select “Install from a list or specific location[Advanced]”, then click on the [Next] button.

If you are using Windows NT 4.0, the “Found New Hardware Wizard” is not started.

Go to Step 4 “Initializing the Software”.



- (2) Specify that folder on the CD-ROM which contains the setup information (INF) file to register the board.

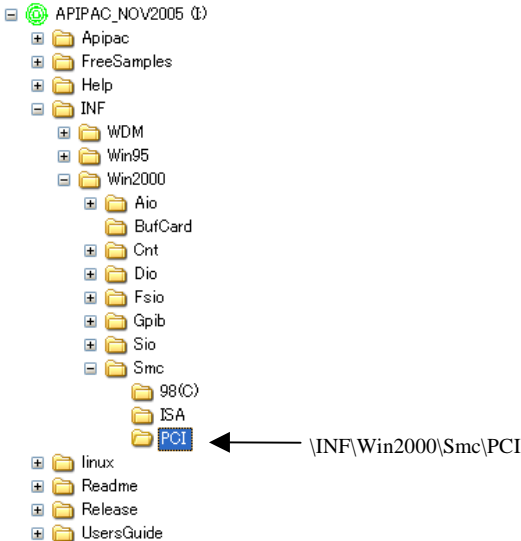


Source folder

The setup information (INF) file is contained in the following folder on the bundled CD-ROM.

Windows XP, 2000	\\INF\\Win2000\\Smc\\PCI
Windows Me, 98, 95	\\INF\\Win95\\Smc\\PCI

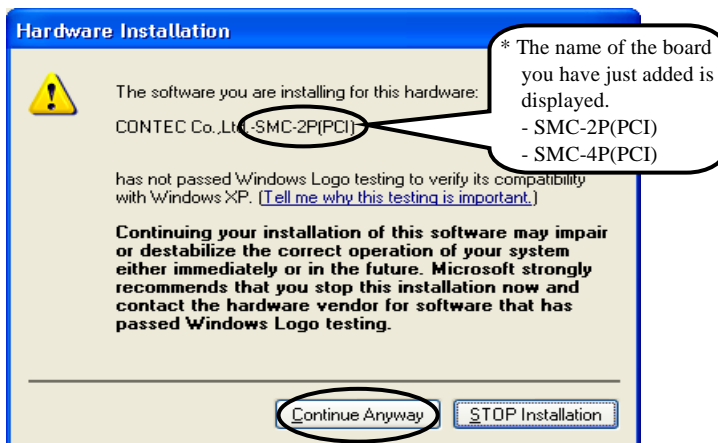
Example of specifying the folder for use under Windows XP



⚠ CAUTION

In Windows XP, the Hardware Wizard displays the following alert dialog box when you have located the INF file. This dialog box appears, only indicating that the relevant driver has not passed Windows Logo testing, and it can be ignored without developing any problem with the operation of the board.

In this case, click on the [Continue Anyway] button.



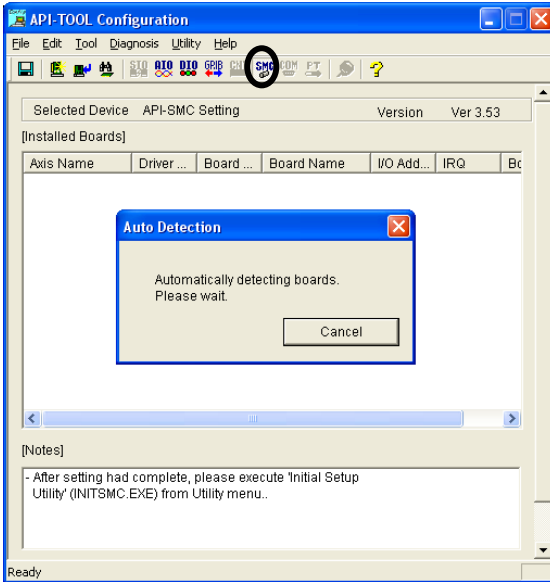
You have now finished installing the hardware.

Step 4 Initializing the Software

The API function library requires the initial setting to recognize the execution environment. It is called the initialization of the API function library.

Invoking API-TOOL Configuration

- (1) Open the Start Menu, then select “Programs” – “CONTEC API-PAC(W32)” – “API-TOOL Configuration”.



- (2) Please click the icon of "SMC".
API-TOOL Configuration detects boards automatically.
The detected boards are listed.

Updating the Settings

- (1) Select “Save settings to registry...” from the “File” menu.

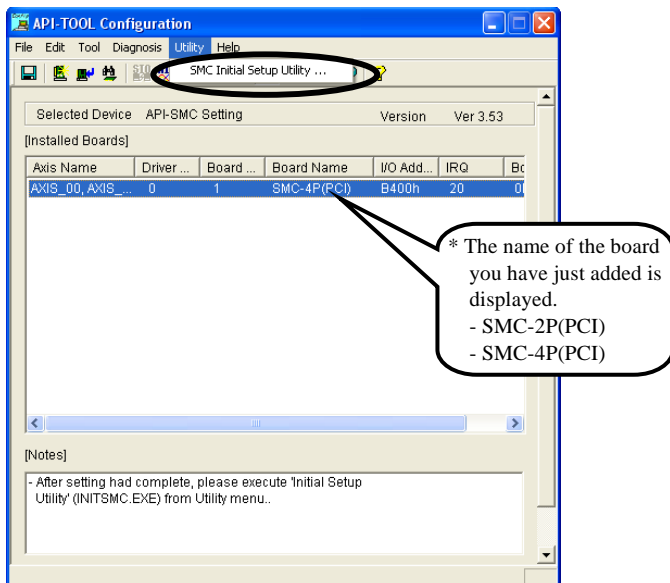
You have now finished installing the initial setting of Software.

Starting the SMC Initial Setup Utility

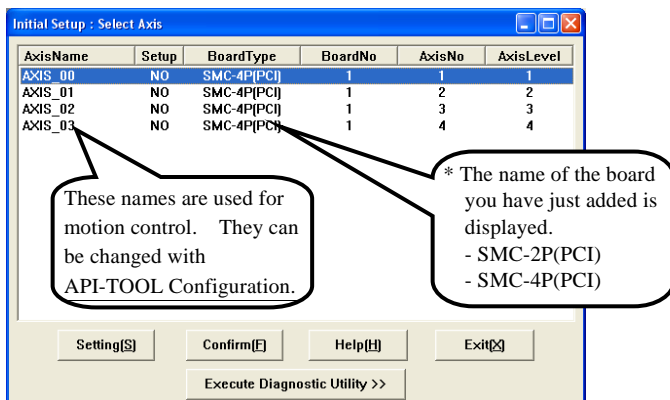
The SMC Initial Setup Utility is used to set and check the initial values of the board. It provides a wizard to help you set the initial values easily and quickly.

- (1) Open the Start Menu, then select “Programs” – “CONTEC API-PAC(W32)” – “API-TOOL Configuration”.

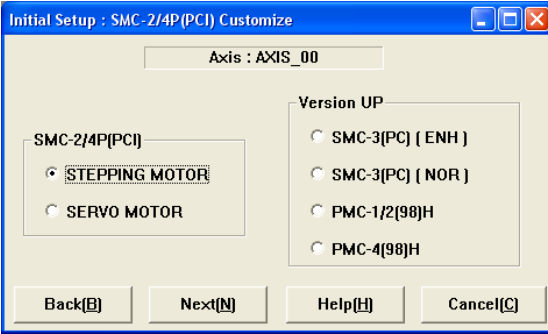
When API-TOOL Configuration has been started, select “SMC Initial Setup Utility...” from the Utility menu.



- (2) Select the axis for which you want to set the board, then click on the [Setting] button.



- (3) Select the type of motor to be used, then click on the [Next] button.



Initial Setup : SMC-2/4P(PCI) Customize

Axis : AXIS_00

SMC-2/4P(PCI)

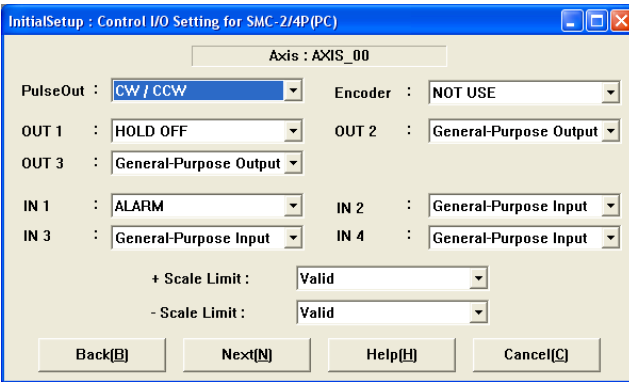
- ☒ STEPPING MOTOR
- ☐ SERVO MOTOR

Version UP

- ☐ SMC-3(PC) (ENH)
- ☐ SMC-3(PC) (NOR)
- ☐ PMC-1/2(98)H
- ☐ PMC-4(98)H

Back[B] Next[N] Help[H] Cancel[C]

- (4) Make settings for the signals to be connected.



InitialSetup : Control I/O Setting for SMC-2/4P(PC)

Axis : AXIS_00

PulseOut : Encoder :

OUT 1 : OUT 2 :

OUT 3 :

IN 1 : IN 2 :

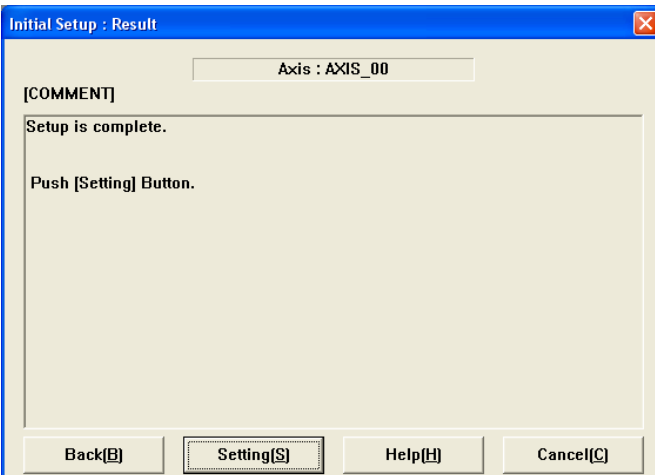
IN 3 : IN 4 :

+ Scale Limit :

- Scale Limit :

Back[B] Next[N] Help[H] Cancel[C]

- (5) Click on [Setting] to determine the initial values.



Initial Setup : Result

Axis : AXIS_00

[COMMENT]

Setup is complete.

Push [Setting] Button.

Back[B] Setting[S] Help[H] Cancel[C]

Step 5 Checking Operations with the Diagnosis Program

Use the diagnosis program to check that the board and driver software work normally, thereby you can confirm that they have been set up correctly.

What is the Diagnosis Program?

The diagnosis program diagnoses the states of the board and driver software.

For Quick Check, the program checks the board resources for validity. The resources include the I/O addresses, interrupt level (IRQ), board ID, and sync signal.

For Detail Check, the program checks the connections of the motor control board, driver unit, and limit sensor for validity. The program inputs/outputs signals in interactive mode to check for validity. Check items are Limit Signals Input, Pulse Input/Output, and Control Signals Input/Output.

Check method

Perform the input/output test and check the execution environment with the driver unit connected.

The dedicated screw terminal CCB-SMC1 will come in handy when you check the board.

The board should be checked with the factory defaults.

For direct connection to the board, see Chapter 3 “External Connection”.

Connection diagram

The following connection diagrams show connections using the dedicated screw terminal CCB-SMC1.

<Pulse output>

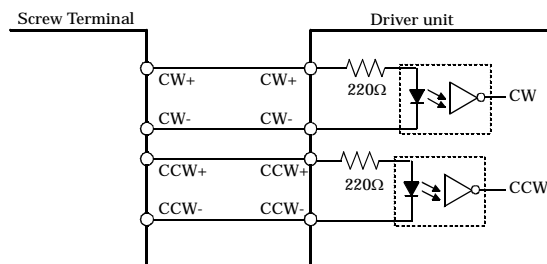


Figure 2.3. Connection diagram < 1 / 2 >

<Limit input>

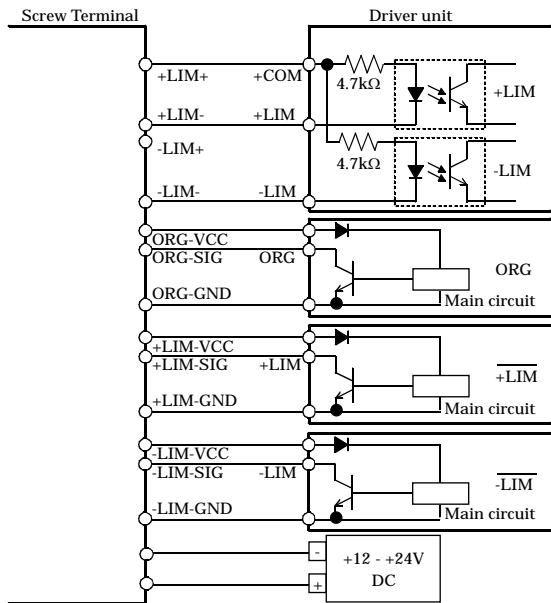


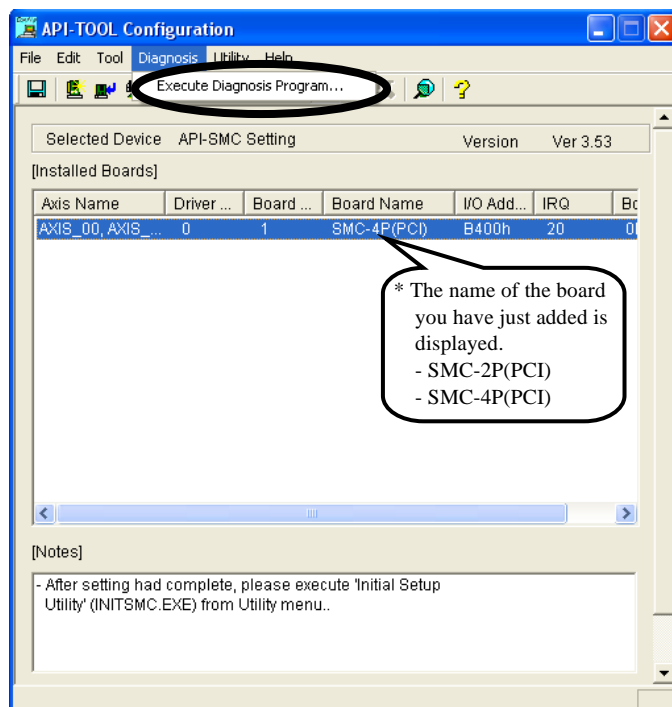
Figure 2.3. Connection diagram < 2 / 2 >

Using the Diagnosis Program

Starting the Diagnosis Program

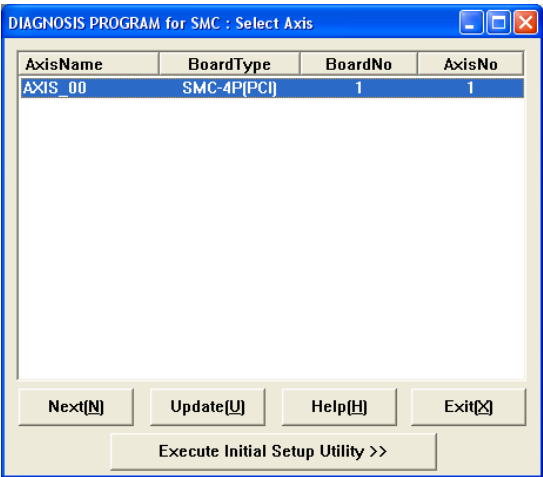
Select the board in the API-TOOL Configuration windows, then run the Diagnosis Program.

* The name of the board you have just added is displayed.

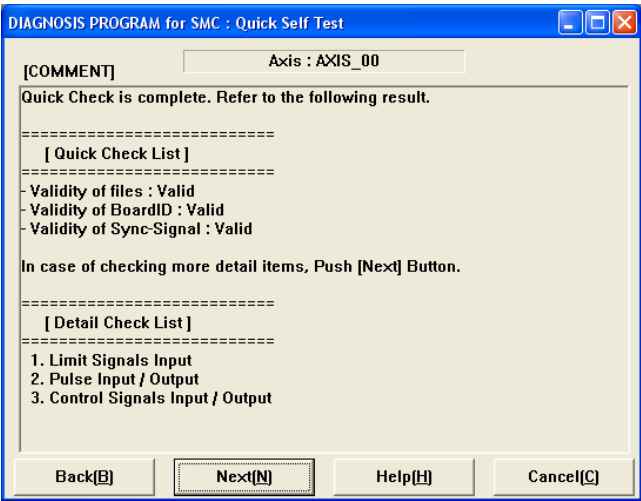


Checking for motor control

- (1) Select the name of the axis you want to diagnose, then click on the [Next] button to execute Quick Check.

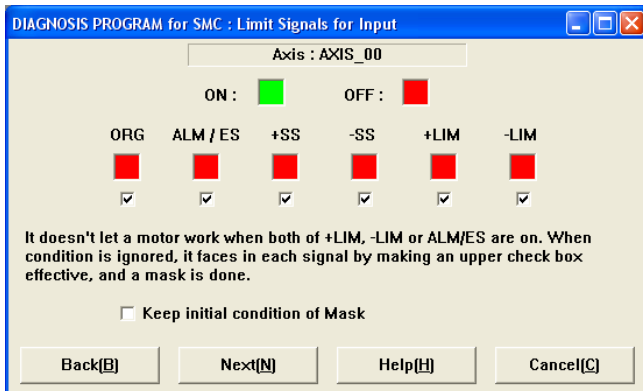


To execute Detail Check, click on the [Next] button. Otherwise, click on the [Back] or [Cancel] button.



(2) Check/mask each signal.

When the alarm (ALM/ES) is ON or each limit (+LIM, -LIM) is ON, the motor does not operate in that direction. In this case, check the connection of the signal or mask it.



DIAGNOSIS PROGRAM for SMC : Limit Signals for Input

Axis : AXIS_00

ON : ■ OFF : ■

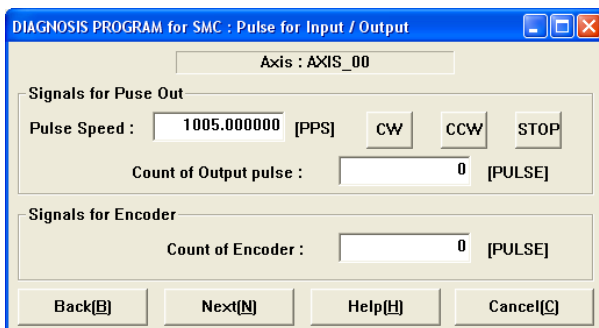
ORG	ALM / ES	+SS	-SS	+LIM	-LIM
■	■	■	■	■	■
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

It doesn't let a motor work when both of +LIM, -LIM or ALM/ES are on. When condition is ignored, it faces in each signal by making an upper check box effective, and a mask is done.

☐ Keep initial condition of Mask

Back(B) Next(N) Help(H) Cancel(C)

(3) Simple operation is performed.



DIAGNOSIS PROGRAM for SMC : Pulse for Input / Output

Axis : AXIS_00

Signals for Pulse Out

Pulse Speed : 1005.000000 [PPS] CW CCW STOP

Count of Output pulse : 0 [PULSE]

Signals for Encoder

Count of Encoder : 0 [PULSE]

Back(B) Next(N) Help(H) Cancel(C)

Setup Troubleshooting

Symptoms and Actions

The board cannot be initialized. [Windows NT 4.0]

The driver may not yet be activated. If your PC is running under Windows NT 4.0, set the PnP OS option in the BIOS Setup menu to "NO".

For details of how BIOS is configured, see your PC's manual.

The board works with the Diagnosis Program but not with an application.

The Diagnosis Program is coded with API-TOOL functions. As long as the board operates with the Diagnosis Program, it is to operate with other applications as well. In such cases, review your program while paying attention to the following points:

- Check the arguments to functions and their return values.
- Check whether the counter mode is appropriate.

The OS won't normally get started or detect the board. [Windows XP, 2000]

Turn off the power to your PC, then unplug the board. Restart the OS and delete the board settings of API-TOOL Configuration. Turn off the PC again, plug the board, and restart the OS. Let the OS detect the board and use API-TOOL Configuration to register board settings.

If your problem cannot be resolved

Refer to API-SMC HELP for troubleshooting. If there is no answer in it, please contact your retailer.

3. External Connection

This chapter describes the interface connectors on the board and the external I/O circuits.

Check the information available here when connecting an external device.

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.

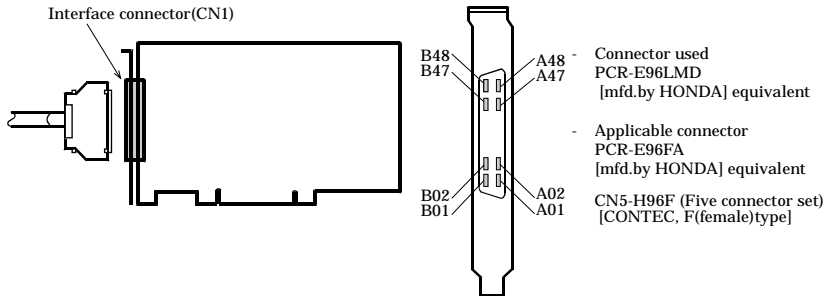


Figure 3.1. Interface connector

Connector Pin Assignment

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

CH0 Phase-A+	A+	[49]	[01]	A48	A+	CH2 Phase-A+
CH0 Phase-A-	A-	[48]	[02]	A47	A-	CH2 Phase-A-
CH0 Phase-B+	B+	[47]	[03]	A46	B+	CH2 Phase-B+
CH0 Phase-B-	B-	[46]	[04]	A45	B-	CH2 Phase-B-
CH0 Phase-Z+	Z+	[45]	[05]	A44	Z+	CH2 Phase-Z+
CH0 Phase-Z-	Z-	[44]	[06]	A43	Z-	CH2 Phase-Z-
CH1 Phase-A+	A+	[43]	[07]	A42	A+	CH3 Phase-A+
CH1 Phase-A-	A-	[42]	[08]	A41	A-	CH3 Phase-A-
CH1 Phase-B+	B+	[41]	[09]	A40	B+	CH3 Phase-B+
CH1 Phase-B-	B-	[40]	[10]	A39	B-	CH3 Phase-B-
CH1 Phase-Z+	Z+	[39]	[11]	A38	Z+	CH3 Phase-Z+
CH1 Phase-Z-	Z-	[38]	[12]	A37	Z-	CH3 Phase-Z-
CH0 Pulse common	P.COM	[37]	[13]	A36	P.COM	CH2 Pulse common
CH0 General-purpose input 1/Alarm input	IN1/ALM	[36]	[14]	A35	IN1/ALM	CH2 General-purpose input 1/Alarm input
CH0 General-purpose input 2/Positioning input	IN2/INP	[35]	[15]	A34	IN2/INP	CH2 General-purpose input 2/Positioning input
CH0 General-purpose input 3/+ Direction slowdown input	IN3/+SD	[34]	[16]	A33	IN3/+SD	CH2 General-purpose input 3/+Direction slowdown input
CH0 General-purpose input 4/- Direction slowdown input	IN4/-SD	[33]	[17]	A32	IN4/-SD	CH2 General-purpose input 4/-Direction slowdown input
CH0 General-purpose input 5	IN5	[32]	[18]	A31	IN5	CH2 General-purpose input 5
CH0 General-purpose input 6	IN6	[31]	[19]	A30	IN6	CH2 General-purpose input 6
CH0 General-purpose input 7	IN7	[30]	[20]	A29	IN7	CH2 General-purpose input 7
CH0 Origin input	ORG	[29]	[21]	A28	ORG	CH2 Origin input
CH0 Positive-direction limit input	+LIM	[28]	[22]	A27	+LIM	CH2 +Direction limit input
CH0 Negative-direction limit input	-LIM	[27]	[23]	A26	-LIM	CH2 -Direction limit input
CH1 Plus common	P.COM	[26]	[24]	A25	P.COM	CH3 Pulse common
CH1 General-purpose input 1/Alarm input	IN1/ALM	[25]	[25]	A24	IN1/ALM	CH3 General-purpose input 1/* Alarm input
CH1 General-purpose input 2/Positioning input	IN2/INP	[24]	[26]	A23	IN2/INP	CH3 General-purpose input 2/Positioning input
CH1 General-purpose input 3/+ Direction slowdown input	IN3/+SD	[23]	[27]	A22	IN3/+SD	CH3 General-purpose input 3/+Direction slowdown input
CH1 General-purpose input 4/- Direction slowdown input	IN4/-SD	[22]	[28]	A21	IN4/-SD	CH3 General-purpose input 4/-Direction slowdown input
CH1 General-purpose input 5	IN5	[21]	[29]	A20	IN5	CH3 General-purpose input 5
CH1 General-purpose input 6	IN6	[20]	[30]	A19	IN6	CH3 General-purpose input 6
CH1 General-purpose input 7	IN7	[19]	[31]	A18	IN7	CH3 General-purpose input 7
CH1 Origin input	ORG	[18]	[32]	A17	ORG	CH3 Origin input
CH1 + Direction limit input	+LIM	[17]	[33]	A16	+LIM	CH3 +Direction slowdown input
CH1 - Direction limit input	-LIM	[16]	[34]	A15	-LIM	CH3 -Direction slowdown input
+5V Output	+5V	[15]	[35]	A14	+5V	+5V Output
CH0 General-purpose output 3/Counter clear	OUT3/CNTCLR	[14]	[36]	A13	+5V	+5V Output
CH0 General-purpose output 2/Alarm clear	OUT2/ALMCLR	[13]	[37]	A12	OUT3/CNTCLR	CH2 General-purpose output 3/counter clear
CH0 General-purpose output 1/Hold-off	OUT1/H.OFF	[12]	[38]	A11	OUT2/ALMCLR	CH2 General-purpose output 2/Alarm clear
CH0 Direction/CCW Output	DCCW	[11]	[39]	A10	OUT1/H.OFF	CH2 General-purpose output 1/Hold-off
CH0 Plus/CW Output	PCW	[10]	[40]	A09	DCCW	CH2 Direction/CCW Output
Ground	GND	[09]	[41]	A08	PCW	CH2 Plus/CW Output
CH1 General-purpose output 3/Counter clear	OUT3/CNTCLR	[08]	[42]	A07	GND	Ground
CH1 General-purpose output 2/Alarm clear	OUT2/ALMCLR	[07]	[43]	A06	OUT3/CNTCLR	CH3 General-purpose output 3/Counter clear
CH1 General-purpose output 1/Hold-off	OUT1/H.OFF	[06]	[44]	A05	OUT2/ALMCLR	CH3 General-purpose output 2/Alarm clear
CH1 Direction/CCW output	DCCW	[05]	[45]	A04	OUT1/H.OFF	CH3 General-purpose output 1/Hold-off
CH1 Plus/CW output	PCW	[04]	[46]	A03	DCCW	CH3 Direction/CCW Output
Ground	GND	[03]	[47]	A02	PCW	CH3 Plus/CW Output
		[02]	[48]	A01	GND	CH3 Ground
		[01]				

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

Note!

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

Figure 3.2. Pin Assignment of an interface connector(CN1)(Board side)

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.

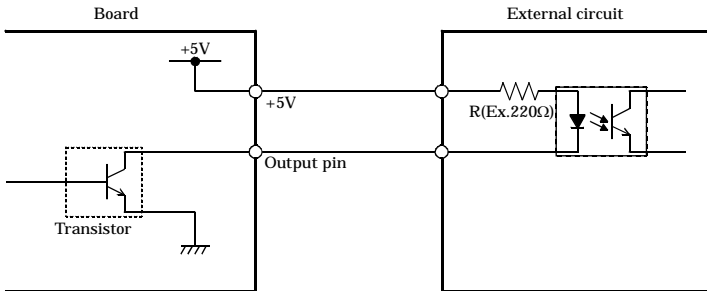


Figure 3.3. Pulse output/general-purpose output/clear pulse output circuit (using internal +5 V)

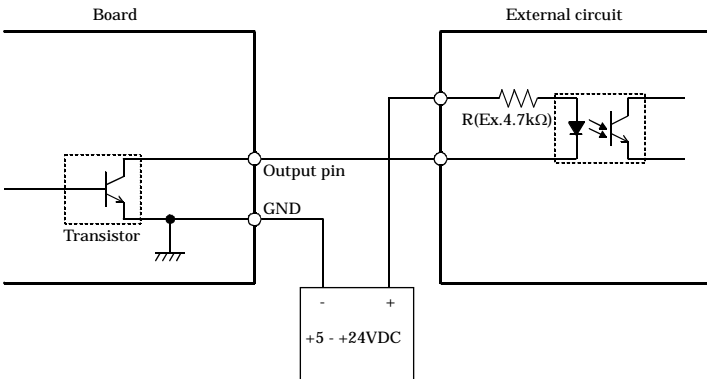


Figure 3.4. Pulse output/general-purpose output/clear pulse output circuit (using an external power supply)

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.

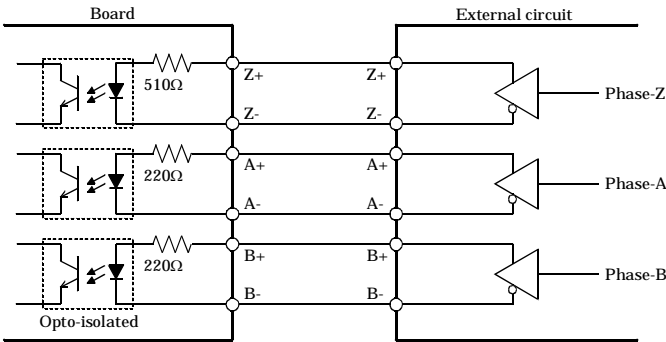


Figure 3.5. Encoder input circuit (Line driver connection)

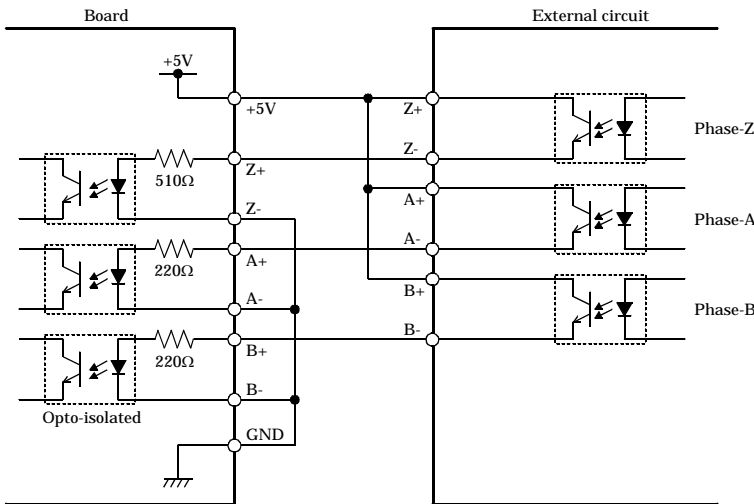


Figure 3.6. Encoder input circuit (Open-collector connection using internal +5 V)

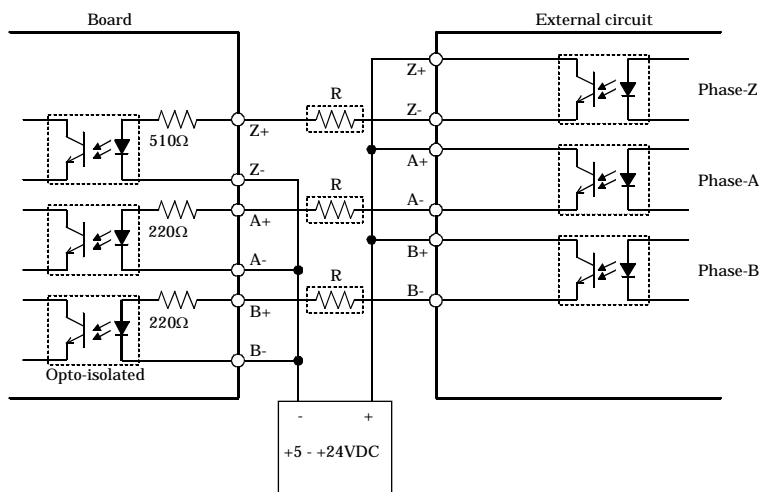


Figure 3.7. Encoder input circuit (Open-collector connection using external power supply)

For open-collector output using an external power supply of +12 - +24 V, insert current-limiting resistors 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.

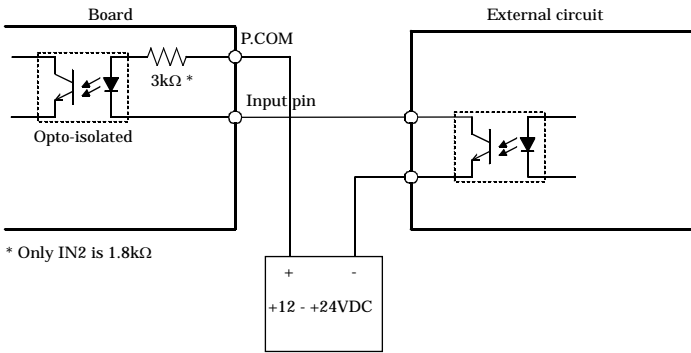


Figure 3.8. Limit output/general-purpose output/clear pulse output circuit

Connection Examples

Given below are practical examples of connection of the SMC-2P(PCI) or SMC-4P(PCI) 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

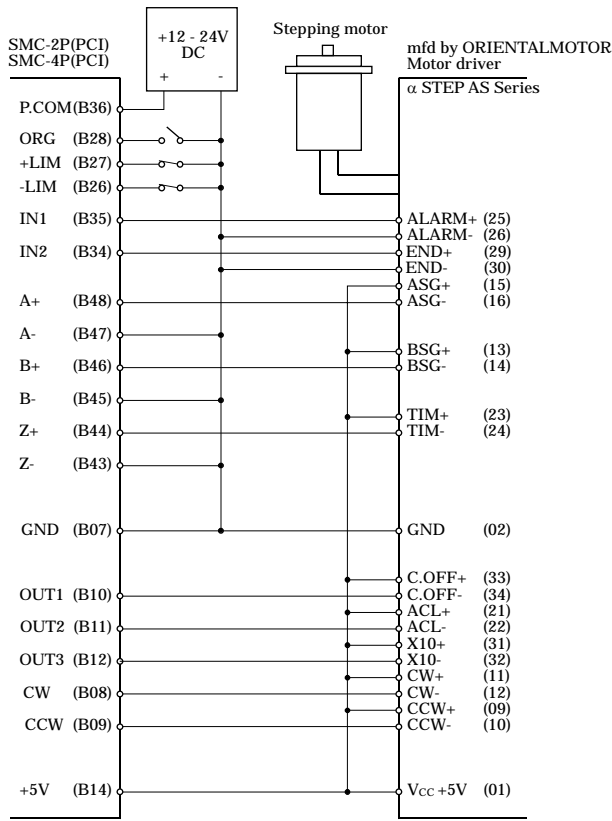


Figure 3.9. Example of Connection to driver unit (α STEP AS Series) for Stepping motor

⚠ 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

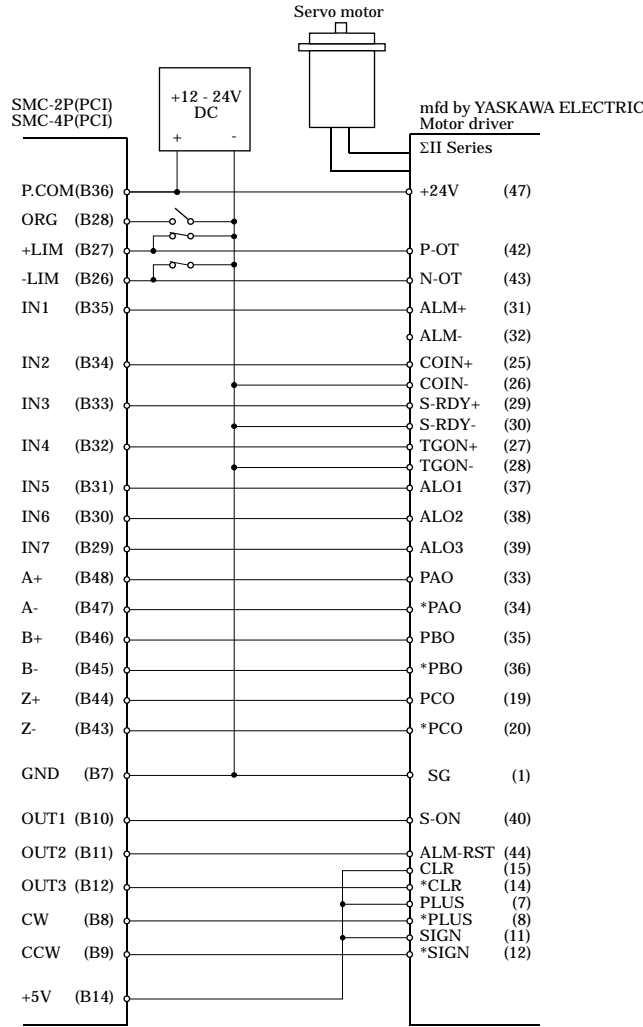


Figure 3.10. Example of Connection to driver unit (Σ II Series) for Servo motor

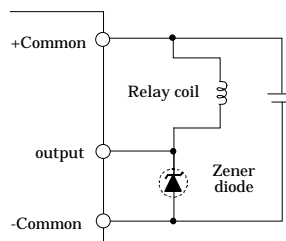
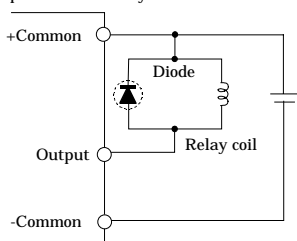
⚠ CAUTION

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.

Surge Voltage Countermeasures

When connecting a load that generates surge voltages and inrush currents, such as an induction load (relay coil) or an incandescent light bulb, to the digital output, appropriate protection must be provided in order to prevent damage to the output stage or a malfunction due to noise. The rapid shutoff of a coil, such as a relay, generates a sudden high-voltage pulse. If this voltage exceeds the voltage tolerance level of the output transistor, it can cause the transistor to gradually deteriorate, or even completely damage the transistor. Therefore, when driving an induction load, such as a relay coil, you should always connect a surge-absorbing device. The following illustrates a surge voltage countermeasure that can be employed:

Examples of use of relay coil



External power voltage < Zener diode voltage

Examples of use of lamp

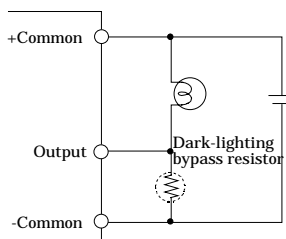
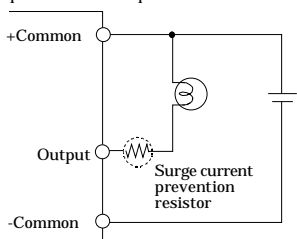


Figure 3.11. Surge Voltage Countermeasure



CAUTION

In order for a protection circuit to operate effectively, it must be connected within 50 cm of a load and a contact point.

About a protection function

The +5V output of this board is provided with a PolySwitch-based protector. If a short circuit is made accidentally between the +5V output and GND, the protector works to temporarily disable the board. If this is the case, turn off the power to your PC and wait for a few minutes, then turn it on back.

4. Functions

This chapter describes the functions of the SMC-2P/4P(PCI).

About each motor control operation

PTP operation function

This function moves the motor from one point to another (Point To Point motion).

Use the function for simple position control.

JOG operation function

This function moves the motor without specifying the travel distance.

Use the function to manually position the motor.

ORG operation function

This function moves the motor to the origin.

Frame (bank) sequence operation function

The board handles a group of parameters required for a motor operation, such as the travel distance, traveling speed, and acceleration/deceleration rate, as a single frame. The board can execute a sequence of contiguous frames downloaded to on-board memory, outmaneuvering conventional motion control boards.

- For a control system to execute a fixed pattern, this function enables high-speed control without CPU intervention.
- As switching from each frame to the next is controlled by hardware, the idling time required for switching forward is within 1μsec, contributing to constructing a highly efficient system.
- In combination with synchronous control, this function enables continuous interpolation control of multiple axes.



CAUTION

Allow an operation time of at least 200μsec per frame, or a sequence of frames may not be executed normally.

Synchronous control function

The board can synchronize the operations of a group of motors associated in a master/slave configuration. Synchronization is the function that makes the motors start operation at the identical timing or, if any of the motors is stopped with an alarm (abnormal stop), stops all the relevant axes at once.

The following types of synchronous control are available.

- Multi-axis synchronous start control
- Multi-axis synchronous stop

S-curve acceleration/deceleration function

The board has the S-curve acceleration/deceleration function in addition to the linear acceleration/deceleration function. The S-curve acceleration/deceleration function reduces acceleration when starting and stopping accelerating/decelerating the motor, thereby suppressing the vibration generated at the start and end of motion.

Meanings of signals

Limit input signals

Limits switches are used to detect the position of the carrier in a positioning system using a stepping motor to stop the motor when the carrier has reached the target position (final destination). The board is also provided with the slow-down stop input to slow down the high-speed rotation at acceleration or deceleration. The mounting position of each limit switch is shown below. The limit function works when current feed to the corresponding pin is stopped while normal operation is performed when the pin is supplied with a current. Note that 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.

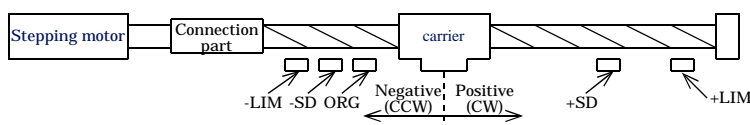


Figure 4.1. The attachment position relation of a limit switch

+LIM(Positive-direction limit), -LIM(Negative-direction limit)

Place +LIM at the end position when the stepping motor rotates clockwise (CW) and -LIM at the end position when the stepping motor rotates counterclockwise (CCW). When the carrier reaches either position (the limit input is turned on), the motor stops immediately unconditionally. Even when a subsequent operation directive (instruction) for moving in the same direction is issued, the carrier won't move forward beyond the limit position as long as the limit has been applied. The motor restarts operation (rotation) in response to an operation directive for moving in the opposite direction. The limit input can be masked by software.

+SD(Positive-direction slow-down), -SD(Negative-direction slow-down)

+SD/-SD is a limit input to detect the position at which to start deceleration during high-speed rotation (accelerating/decelerating operation). The carrier operating (moving) at high speed starts deceleration at that position and stops after slowing down to the initial speed. The limit input can be masked by software.

ORG(Stepping motor rotation origin)

ORG is the switch input to detect the origin to be set as the base point for each operation. The motor stops at the origin. An arbitrary position can be determined by the number of steps from that position.

Encoder input signal

The board has phase-A, phase-B, and phase-Z encoder inputs, each of which can be used as an open-collector or line driver input.

Pulse output signal

The board has independent pulse (CW, CCW) outputs and common pulse outputs (pulse output, direction output) as well. You can use (select) the appropriate ones depending on the type of the stepping motor drive unit to be used (connected). These pulse outputs are open-collector outputs which are not pulled up internally. You should therefore check the specifications of the motor driver unit to be used before connecting the outputs. The output polarity (logic) of output pulses can be changed by software.

CAUTION

The board cannot directly drive the stepping motor. These pulse output signals must therefore be connected to the motor driver unit prepared for the stepping motor.

PCW(Positive-direction pulse output), DCCW(Negative-direction pulse output)

PCW (forward pulse output) is the pulse output signal to rotate (operate) the stepping motor clockwise (CW). DCCW (backward pulse output) rotates the motor counterclockwise (CCW). These signals are independent of each other. When a command for rotation is executed, the pulse signal for the specified direction outputs the preset number of operation pulses.

PCW(Pulse output), DCCW(Direction output)

PCW (pulse output) is the serial pulse output that carries the above CW and CCW signals on a single line. The CW and CCW directions are indicated by the signal status of DCCW (direction output). Note that the DCCW signal is valid only when the PCW signal is active.

General-purpose input signals

The board has general-purpose input signals d(IN1 - IN7) and general-purpose output signals (OUT1 - OUT3) in addition to limit input, encoder input, and pulse output signals.

IN1 - IN7(General-purpose input signals)

IN1 - IN7 (general-purpose input signals) can be used to read data from I/O ports. Since these are independent of motor control, they do not affect pulse output even during motor operation. As seven signals are provided for each channel, they can be used to input the alarm signal or positioning completion signal from the motor driver unit. IN1 to IN4 can be switched to serve as the alarm input, positioning completion, +SD input, and -SD input signals, respectively. The input logic can also be changed by software.

ALM(Alarm input signal)

ALM is the input signal to detect the alarm signal from the motor driver. The input logic can be changed by software.

INP(positioning completion signal)

INP is the signal to detect the positioning completion signal from the motor driver unit. The input logic can be changed by software.

OUT1 to OUT3(General-purpose output signals)

OUT1 to OUT3 (general-purpose output signals) can be used to write data to I/O ports. Since these are independent of motor control, they do not affect pulse output even during motor operation. As three signals are provided for each channel, they can be used to output the hold-off signal or clear signals to the motor driver unit. OUT1 to OUT3 can be switched to serve as the hold-off, alarm clear output, and deviation counter clear output signals, respectively. The output logic can also be changed by software.

H.OFF(Hold-off signal)

H.OFF is the signal output to the hold-off input of the motor driver unit. The output logic can also be changed by software.

ALMCLR(alarm clear output signal), CNTCLR(deviation counter clear signal)

ALMCLR and CNTCLR are signals to output clear one-shot pulses to the alarm clear and deviation counter clear inputs of the motor driver unit. The width of one-shot pulses (output logic changeable) can be selected from among 100 μ sec, 1 msec, 10 msec, and 100 msec.

P.COM(Plus common signal)

P.COM is the plus common signal for limit input signals (+LIM, -LIM, +SD, -SD) and general-purpose input/output signals (IN1 to IN7, OUT1 to OUT3).

GND(Ground)

GNS is the ground line for pulse output signals (PCW, DCCW) and general-purpose output signals (OUT1 to OUT3).

+5V(+5V Output)

+5V supplies power at +5 V from the +5V terminal on the PC to the external device. A maximum of 1 A can be supplied to the external device.

Connecting the synchronization control connectors

The Board has synchronization control connectors (CN2 and CN3) to accept synchronization signal cables for synchronous operations of two or more boards.

Connection method

For synchronous operations of two or more boards, connect them with synchronization signal cables. Use a synchronization signal cable to connect the CN2 of a smaller ID board to the CN3 of the board with a greater board ID number.

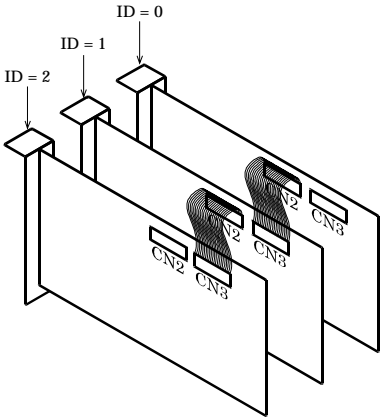


Figure 4.2. Connection method of a cable

Master/slave configuration example

Cable connection		un-connection				connection				connection				un-connection	
Hardware	Synchronous connector No.	CN3								CN2	CN3				CN2
	BoardID No.	1st sheet(ID = 0)				2nd sheet(ID = 1)				3rd sheet(ID = 2)					
	Channel No.	CH0	CH1	CH2	CH3	CH0	CH1	CH2	CH3	CH0	CH1	CH2	CH3		
Axis level No.		1	2	3	4	5	6	7	8	9	10	11	12		
Configuration example 1		M	M	M	M	M	M	M	M	M	M	M	M		
Configuration example 2		M	S	S	S	S	S	S	S	S	S	S	S		
Configuration example 3		M	M	S	M	S	S	M	S	S	S	M	S		
		Group1	Group2		Group3			Group4				Group5			

<Annotation>

- In the above table, M and S stand for master and slave, respectively.
 - Axis level No. : Number assigned automatically by Initial Setup Utility
 - Configuration example 1 : When all channels are independent
 - Configuration example 2 : When all channels are in one group
 - Configuration example 3 : Composite pattern
- <Notes on setup>
- When two or more channels make up a group, set the channel with the lowest level number to the master (M).

Figure 4.3. Master/slave configuration example

Motion control system

System configuration

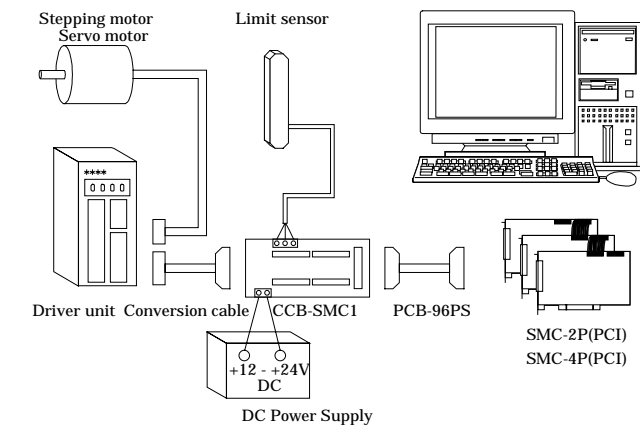


Figure 4.4. System configuration

Table 4.1. Component features

Item	Description
SMC-2P(PCI) SMC-4P(PCI) (Main board)	When installed on the PC, this board generates pulses required for position control.
PCB-96PS (Option)	This cable connects the board to the CCB-SMC1.
CCB-SMC1 (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 (User)	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-SMC1.
Driver unit (Motor maker)	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.
Stepping motor Servo motor (Motor maker)	
Limit sensor (Switch maker)	
DC Power supply (Power supply maker)	This sensor is installed at the forward/backward limit and origin limit 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.
	Power supply to the CCB-SMC1. Use a 12- or 24-VDC power supply.

Signal correspondence between the board and driver unit

Table 4.2. Signal correspondence between the board and driver unit

Signal name	Driver unit for Stepping motor	Driver unit for Servo motor
PCW/DCCW	CW/CCW(Command pulse input)	CW/CCW(Command pulse input)
A+, A-, B+, B-	---	A+, A-, B+, B-(Encoder pulse input)
Z+, Z-	Z+, Z-(Phase-Z output)	Z+, Z-(Phase-Z output)
OUT1	H.OFF(Hold-off input)	SRV-ON(Hold-on input)
OUT2	RES(Alarm clear input)	RES(Alarm clear input)
OUT3	C/S(Step angle selection)	CL(Deviation counter clear input)
IN1	ALM(Alarm input)	ALM(Alarm input)
IN2	---	INP(Positioning completion)
IN3	---	RD(Servo ready output)
IN4	---	TGON(Motor rotation detection)
IN5, IN6, IN7	---	ALC(Alarm code)

5. About Software

CD-ROM Directory Structure

```

\
|—Autorun.exe           Installer Main Window
|
|  Readmej.html         Version information on each driver (Japanese)
|  Readmeu.html         Version information on each driver (English)
|
|  .
|  .
|—APIPAC                Each installer
|
|  |—AIO
|  |
|  |  |—DISK1
|  |  |—DISK2
|  |  |—.....
|  |  |—DISKN
|  |—AioWdm
|  |—CNT
|  |—DIO
|  |—.....
|
|  .
|  .
|—HELP                  HELP file
|
|  |—Aio
|  |—Cnt
|  |—.....
|
|  .
|  .
|—INF                   Each INF file for OS
|
|  |—WDM
|  |—Win2000
|  |—Win95
|
|  .
|  .
|—Readme                Readme file for each driver
|
|  .
|  .
|—Release                Driver file on each API-TOOL
|  |—API_NT              (For creation of a user-specific install program)
|  |—API_W95
|
|  .
|—UsersGuide             Hardware User's Guide(PDF files)

```


About Software for Windows

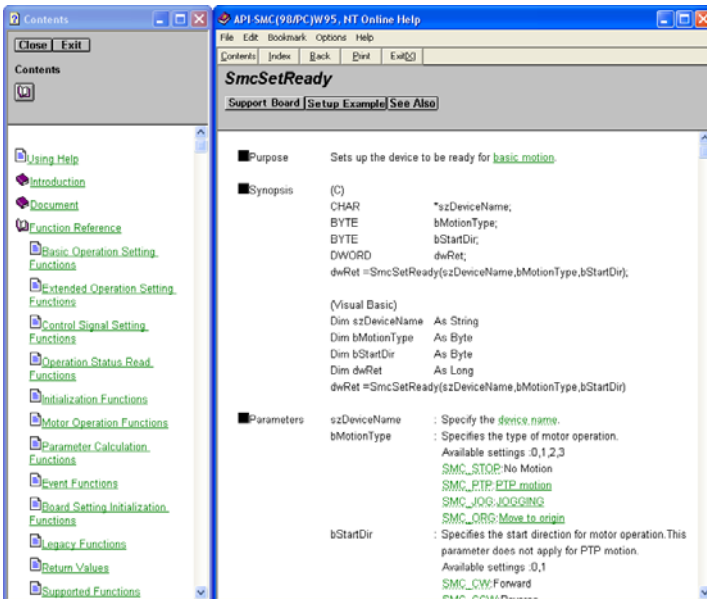
The bundled CD-ROM “API Function Library Package API-PAC(W32)” contains the functions that provide the following features:

- Function to easily set and control the position of the stepping motor or servomotor.
- Function to use Initial Setup Utility that provides a wizard to make complicated initial value setting easier.
- Function to set and execute basic motor operations such as PTP and JOG operations.
- Function to easily set and execute motor control at high speed in a pre-designed operation pattern using banks.
- Function to control multiple axes synchronously, capable of continuous interpolation of N axes.

For details, refer to the help file. The help file provides various items of information such as “Function Reference”, “Sample Programs”, and “Q&A”. Use them for program development and troubleshooting.

Accessing the Help File

- (1) Click on the [Start] button on the Windows taskbar.
- (2) From the Start Menu, select “Programs” – “CONTEC API-PAC(W32)” – “SMC” – “API-SMC HELP” to display help information.



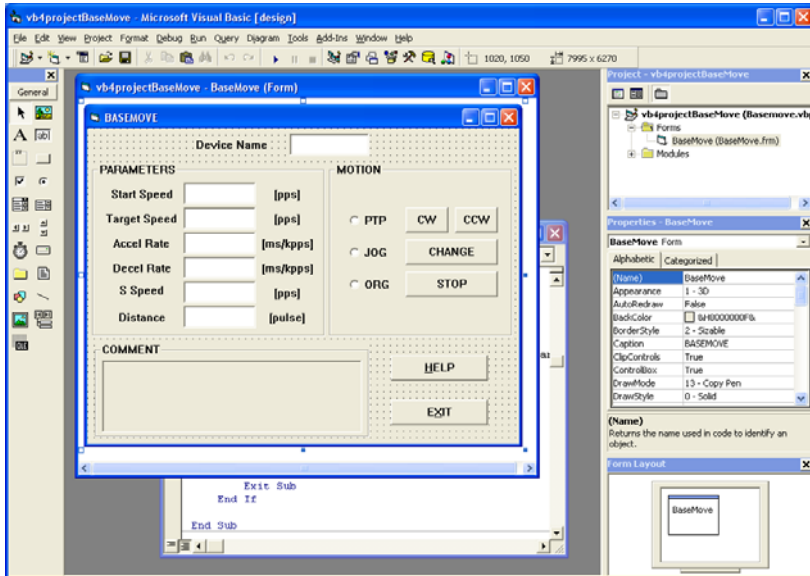
Using Sample Programs

Sample programs have been prepared for specific basic applications.

To use each sample program, enter its driver number and group number set by API-TOOL Configuration in the DrvNo and GrpNo fields.

Use these sample programs as references for program development and operation check.

The sample programs are stored in \Program Files\CONTEC\API-PAC(W32)\Smc\Samples.



Sample Programs - Examples

Basic operation

- BaseMove : Uses basic operation setting functions to perform basic motor operations.

Extended (bank) operation

- BankMlt : Uses extended operation setting functions to perform PTP operations of three axes at high speed.
- BankSpd : Uses extended operation setting functions to perform variable-speed operation of one axis.

Control input and output

- CtlIo : Uses control signal setting functions to check control input/output signals.

Status monitor

- Status : Uses the operation status get function to check the operation status.

Event operation

- Event : Uses the event function to monitor operations by checking events.

[BaseMove]

BASE MOVE

Device Name:

PARAMETERS

Start Speed: [pps]

Target Speed: [pps]

Accel Rate: [ms/kpps]

Decel Rate: [ms/kpps]

S Speed: [pps]

Distance: [pulse]

MOTION

☒ PTP ☐ JOG ☐ ORG

COMMENT

O K

[BankMlt]

BANK MLT

BANK MOTION

☒ SINGLE ☐ LOOP

X Axis Name:

Y Axis Name:

Z Axis Name:

COMMENT

O K

[CtlIo]

CONTROL I/O

Device Name:

Control I/O

Output Data:

Input Data:

COMMENT

O K

[Status]

STATUS

Device Name:

STATUS

Output Count: [pulse]

Encoder Count: [pulse]

Bank No:

Output Status:

Move Status:

Stop Status:

Limit Status:

COMMENT

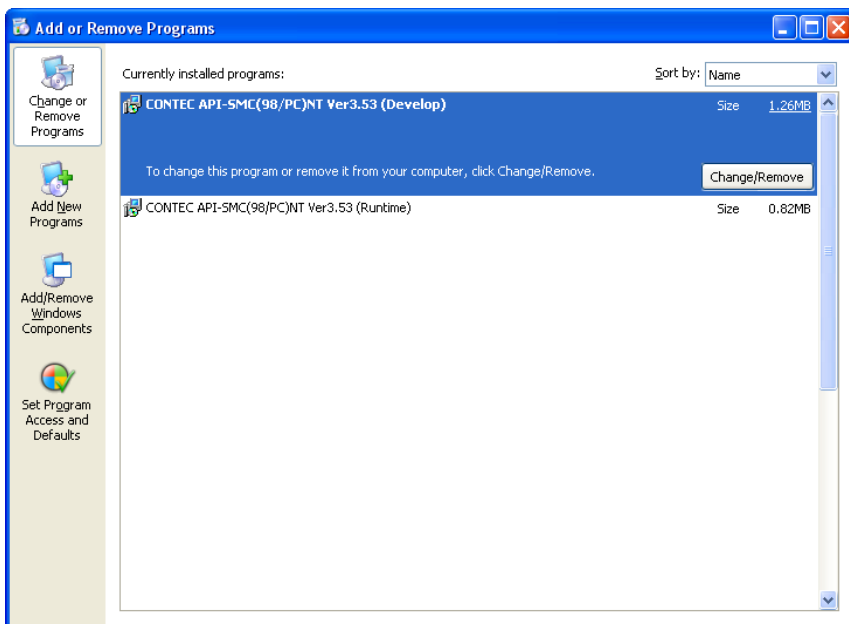
O K

Uninstalling the Driver library

To uninstall API-PAC(W32), follow the procedure below.

- (1) Click on the [Start] button on the Windows taskbar. From the Start Menu, select “Settings” – “Control Panel”.
- (2) Double-click on “Add or Remove Programs” in the Control Panel.

Select “CONTEC API-SMC(98/PC)xx” from the application list displayed, then click on the [Add/Remove] button. Follow the on-screen instructions to uninstall the function libraries.



6. About Hardware

This chapter provides hardware specifications and hardware-related supplementary information.

For detailed technical information

For further detailed technical information (“Technical Reference” including the information such as an I/O map, configuration register, etc.), visit the Contec's web site (<http://www.contec.com/support/>) to call for it.

Hardware specification

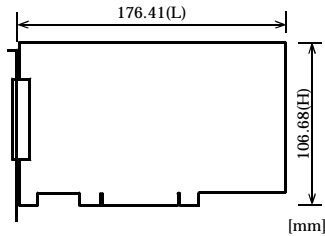
Tables 6.1 - 6.7 list the hardware specifications of the board.

Table 6.1. Common Section

Item	Specification	
	SMC-2P(PCI)	SMC-4P(PCI)
Control target	Stepping motor or servo motor driver unit(pulse train input type)	
Number of axes to control	2axes	4axes
Interrupt	None	
Device used	PCL5014(Nippon Pulse Motor CO., LTD.)	
I/O address	Any 16-byte boundary	
Current consumption	5VDC 800mA Max.	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	120g	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 SMC-2P(PCI): If the board No. is 7157, PCI bus specification is 32bit, 33MHz, 5V.
SMC-4P(PCI): 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.

Table 6.2. 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 resistance	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%)

Table 6.3. 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 resistance	3kΩ
Input ON current	3.4mA or more
Input OFF current	0.16mA or less
External circuit power supply	12 - 24VDC(±15%)

Table 6.4. 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 resistance	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%)

Table 6.5. 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.

Table 6.6. 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.

Table 6.7. 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.

Block Diagram

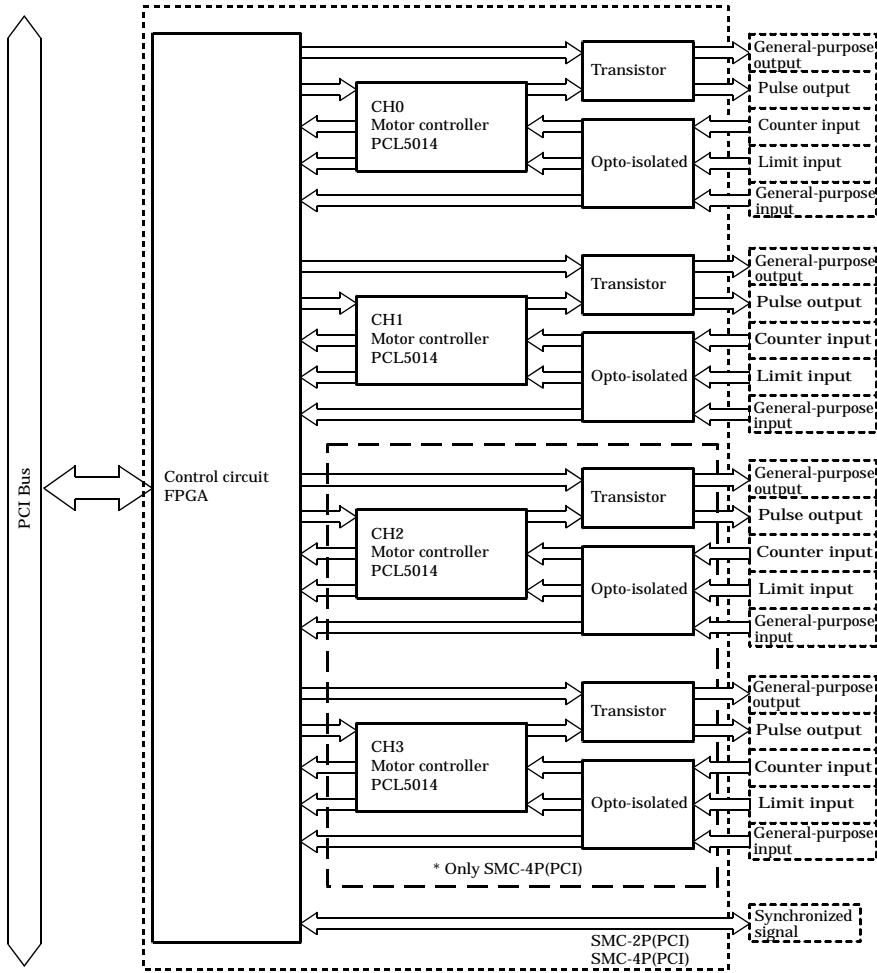


Figure 6.1. Block Diagram

SMC-2P(PCI) SMC-4P(PCI) User's Guide

CONTEC CO.,LTD.

December 2005 Edition

3-9-31, Himesato, Nishiyodogawa-ku, Osaka 555-0025, Japan

Japanese <http://www.contec.co.jp/>

English <http://www.contec.com/>

Chinese <http://www.contec.com.cn/>

No part of this document may be copied or reproduced in any form by any means without prior written consent of CONTEC CO., LTD.

[11302005]

[09161999]

Management No. A-46-075

[12192005_rev5]

Parts No. LZJ4341