

D COUNTERS / MOTOR CONTROLLERS

Counter

D-02 Product Lineup / Basic Knowledge

D-03 PCI

D-04 USB

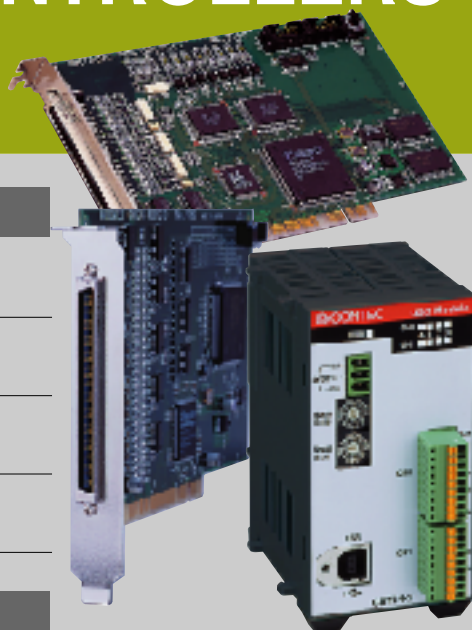
D-04 ISA

Motor Controller

D-05 Product Lineup / Basic Knowledge

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[Product Lineup]

● PCI / Low Profile PCI

Name	Channels	Counting System				Max. Count (bit)	Input Circuit			Response Frequency			Interrupt Function		Other Function			Software		Page
		UP	DOWN	Single-phase	Two-phase		Opto-isolated input	TTL-level input	Line-receiver	Opto-isolated input	TTL-level input	Line-receiver	Count Coincidence	Time-up	Filter	Coincidence Output	ACX-PAC(W32)	API-PAC(W32)		
CNT24-4(PCI)	4	○	○	○	○	24	○	○	—	500KHz	1MHz	—	○	○	○	○	○	○	Included	D-03
CNT24-4D(PCI)	4	○	○	○	○	24	—	○	○	—	1MHz	1MHz	○	○	○	○	○	○	Included	D-03
CNT32-8M(PCI)	8	○	○	○	○	32	—	○	○	—	10MHz	10MHz	○	○	○	○	○	—	Included	D-03

● USB

Name	Channels	Counting System				Max. Count (bit)	Input Circuit			Response Frequency			Interrupt Function		Other Function			Software		Page
		UP	DOWN	Single-phase	Two-phase		Opto-isolated input	TTL-level input	Line-receiver	Opto-isolated input	TTL-level input	Line-receiver	Count Coincidence	Time-up	Filter	Coincidence Output	ACX-PAC(W32)	API-PAC(W32)		
CNT24-2(USB)GY	2	○	○	○	○	24	○	—	—	500KHz	—	—	—	—	○	○	○	○	Included	D-04

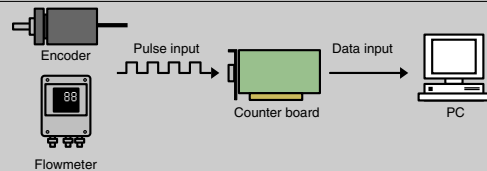
● ISA

Name	Channels	Counting System				Max. Count (bit)	Input Circuit			Response Frequency			Interrupt Function		Other Function			Software		Page
		UP	DOWN	Single-phase	Two-phase		Opto-isolated input	TTL-level input	Line-receiver	Opto-isolated input	TTL-level input	Line-receiver	Count Coincidence	Time-up	Filter	Coincidence Output	ACX-PAC(W32)	API-PAC(W32)		
COM-2(PCI)F	4	○	○	○	○	24	○	○	—	500KHz	1MHz	—	○	○	○	○	○	○	○	D-04

Counters - Basic knowledge

1. What is a counter?

Counters monitor the pulse string and count pulse numbers. Internally the board takes this data and adds, subtracts or reads the current count value as is necessary. Counters are used with incremental rotary encoders, linear gauges, pulse output flow meters or wattmeters to use.



2. Counter function

■ Count system

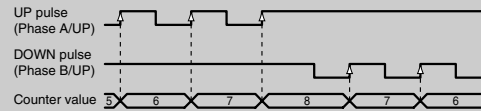
This is the direction which the count can be set and the input status of the signals.

Up-count:

Signifies that an "up-count" (addition) of the signal is possible.

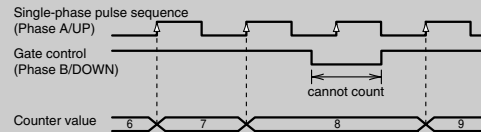
Single-phase pulse input:

Allows two input terminals (UP pulse and DOWN pulse) to be used. Performs an "up-count" when the input is sent to the UP pulse terminal and a "down-count" when the input is sent to the DOWN pulse terminal.



Single-phase input with gate control

Controls the counter Start/Stop with a single-phase pulse sequence and input gate control signal. The counter value is set to 0 with a Clear signal.

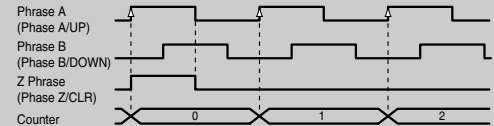


Up-down count:

Both up-count (addition) and down-count (subtraction) of the signals are possible.

Double-phase pulse input:

Two input terminals with their phases differing by 90 degrees - Phase A (lead signal) and Phase B (lag signal) - are used. The phase difference between A and B is used to determine the count direction and to make a count.



■ Maximum number of counts

The maximum number of counts is indicated by the bit number. For example, if it is a 24 bit type, 0 - 16, 777, 215 (0 - FFFFFFFF) can be counted.

■ Input circuit

Signifies the format of the pulse input circuit.

Opto-coupler insulation circuit:

A circuit where an opto-coupler (cathode side) serves as an input terminal. Since it is insulated from external circuits, electrical disturbances can be prevented.

Differential input:

A level input circuit in which the differential receiver serves as an input terminal. Although it is not insulated from external circuits, it is capable of high-speed pulse input and facilitates long distance data transfer.

TTL-level Input

An input circuit in which TTL-IC (base) serves as an input terminal. It is insulated from external circuits, but is capable of high-speed pulse input.

■ Response frequency

"Response frequency is the maximum speed that the pulse can be input as frequency." The response frequency will vary depending on the input circuit and the individual counter board.

■ Interrupt event function

This is what generates an interrupt (IRQ) based on preset conditions. Notification of the event is then sent to the application program.

Count match

This is a random comparison of the set value and the input pulse number. An interrupt (IRQ) is generated when they match. Count value monitoring and event processing can be performed without applying an additional load on the host computer.

Timer "time up"

Interrupts are generated according to a cycle that is preset in the internal timer. This function allows count values to be easily read in the specified cycle.

■ Additional functions

Count match pulse output

This function compares a randomly set value with the input pulse number. A one-shot output pulse is generated when these values match. The comparison value can be set for each channel. Monitoring of the count value and trigger output to external devices is achieved without applying an additional load on the host computer

Filtering

Filtering delays the count processing for a preset time. It then enables precise operation by preventing miscounts due to noise (such as chattering).

4 Channel 24-Bit Up/Down Counter CNT24-4(PCI)



Includes API-PAC(W32) [API Function Library]

SPECIFICATIONS

Number of Channels	4
Counting System	24-Bit Up/Down Counter (two-phase/single-phase/single-phase w/Gate Control)
Input signals	Phase A/UP: 1 point x 4ch Phase B/DOWN: 1 point x 4ch Phase Z/CLR: 1 point x 4ch Common input: 1 point x 4ch
Response frequency (Max.)	TTL-level input: 1MHz (duty: 50%) Opto-isolated input: 500kHz (duty: 50%)
Timer	1msec~200sec
Max. Count	24-bit binary data
Input specifications	TTL-level: 1 TTL-level load Opto-isolated: DC5V~12V Impedance: 220Ω
Interrupts	One point generated when the count of each channel matches or the timer runs out of time
I/O address	Occupies 4 ports
Additional functions	Filter and Counter coincidence pulse output

FEATURES

- 4 channel, 24-bit up/down counter
- Able to count two-phase signals from devices such as rotary encoders or linear gauges (4 encoders-max- can be connected)
- Equipped with a programmable timer

Power Consumption	5VDC 400mA (max)
Connector	Opto-isolated input: DCLC-J37SAF-20L9 [JAE] or equivalent TTL-level input: PS-30PE-D4TIPNI [JAE] or equivalent
PCI Bus / Dimensions (mm)	32bit, 33MHz, 5V / 176.41(L) x 106.68(H)
Options	
Software	ACX-PAC(W32)BP, ACX-PAC(W32)AP
Accessories	DTP-3(PC), DTP-4(PC), EPD-37A ^{*2} , EPD-37 ^{*2}
Cables / Connectors	PCA37P, PCB37P, PCA37PS, PCB37PS, DT/O, DT/B2, CN5-D37M

*1: Requires use of optional cable PCB37P or PCB37PS

4 Channel 24-Bit Differential Up/Down Counter CNT24-4D(PCI)



Includes API-PAC(W32) [API Function Library]

SPECIFICATIONS

Number of Channels	4
Counting System	24-Bit Up/Down Counter (two-phase/single-phase/single-phase w/Gate Control)
Input signals	Phase A/UP: 1 point x 4ch Phase B/DOWN: 1 point x 4ch Phase Z/CLR: 1 point x 4ch Common input: 1 point x 4ch
Response frequency (Max.)	Differential input: 1MHz (duty: 50%) TTL-level input: 1MHz (duty: 50%)
Timer	1msec~200sec
Max. Count	24-bit binary data
Input specifications	TTL-level: 1 TTL-level load Differential: input voltage range 7V ±
Interrupts	One point generated when the count of each channel matches or the timer runs out of time
I/O address	Any 32-byte boundary
Additional functions	Filter and Counter coincidence pulse output

FEATURES

- 4 channel, 24-bit up/down counter
- Able to count two-phase signals from devices such as rotary encoders or linear gauges (4 encoders-max- can be connected)
- Equipped with a programmable timer
- Differential input area is equipped with a surge protection device

Power Consumption	5VDC 500mA (max)
Connector	PCR-E96LMD[HONDA Tsushin Kogyo] or equivalent
PCI Bus / Dimensions (mm)	32bit, 33MHz, 5V / 176.41(L) x 106.68(H)
Options	
Software	ACX-PAC(W32)BP, ACX-PAC(W32)AP
Accessories	DTP-3(PC)*1, DTP-4(PC)*1, EPD-37A*1, EPD-96*2, DTP-64(PC)*2, CCB-96*2,
Cables / Connectors	PCA96P, PCA96PS, PCB96P, PCB96PS, PCB96W, PCB96WS, CN5-D37M

*1: Requires use of optional cable PCB37P or PCB37PS
*2: Requires use of optional cable PCB96P or PCB96PS

PCI Bus Master High Speed 8 channel 32-Bit Up/Down Counter CNT32-8M(PCI)



Includes API-PAC(W32) [API Function Library]

SPECIFICATIONS

Number of Channels	4
Counting System	32-Bit Up/Down Counter (two-phase/single-phase/single-phase w/Gate Control)
Input signals	Phase A/UP: 1 point x 8ch Phase B/DOWN: 1 point x 8ch Phase Z/CLR: 1 point x 8ch Common input: 1 point x 8ch
Response frequency (Max.)	Differential input: 10MHz (duty: 50%) TTL-level input: 10MHz (duty: 50%)
Timer	1-6553msec (selectable in step of 1msec)
Max. Count	32-bit binary data
Input specifications	TTL-level: 1 TTL-level load Differential: input voltage range 7V ±
Interrupts	1 interrupt (factors: count match, count error, SCC error, carry/borrow, timer)

FEATURES

- 4 channel, 24-bit up/down counter
- Able to count two-phase signals from devices like rotary encoders or linear gauges
- Disconnection can be detected at the time of differential input
- Using bus master transfer, data between the board and PC can be transferred at a speed of 80MB/sec (max.133MB/sec) with no additional load on the computer.
- Synchronous Control Connector to enable the synchronous operation of a number of boards (regardless of type).

I/O address	Any 32-byte boundary
Additional functions	Filter, counter coincidence pulse output, test pulse output and disconnection alarm output
Power Consumption	5VDC 500mA (max)
Connector	PCR-E96LMD[HONDA Tsushin Kogyo] PS-10PE-D4L1-B1[JAE] or equivalent x 2
PCI Bus / Dimensions (mm)	32bit, 33MHz, 5V / 176.41(L) x 106.68(H)
Options	
Software	-
Accessories	EPD-96 ^{*1} , DTP-64 ^{*1}
Cables / Connectors	PCA96P-1.5, PCA96PS-1.5, PCB96P-1.5, PCB96PS-1.5

*1: Requires use of optional cable PCB96P or PCB96PS

Functions

Bus master

Periodic sampling of count data using internal or external clock, with data transfer input

Diverse input/output control

The external input signals can be set to preset / zero clear of count value and start. It can also output a one-shot pulse in the event of error or count match.

Interrupt event

Various interrupt events are provided such as count match, time-up, error occurrence, generation of carry/borrow and completion of sampling.

Differential counter

In addition to the normal counter function, a differential counter is also provided in specified cycles.

D-03

COUNTERS / MOTOR CONTROLLERS

Counters

Product Lineup / Basic Knowledge

PCI

USB

ISA

Motor Controllers

Product Lineup / Basic Knowledge

PCI

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[COUNTERS / MOTOR CONTROLLERS] Counters - USB / ISA

For options, please see Page J-14 (Accessories & Cables) and Page I-01 (Software).

Opto-Isolated Counter
CNT24-2(USB)GY



FEATURES

- Supports a variety of counter modes
- Counter coincidence pulse output (signal frequency can be set 0-104.5ms)
- Digital filter (0.1-1056.1μs, variable sampling range frequency)
- 2 screwless connectors for attaching and detaching wires easily (no special tools required)
- Additional channels through use of extension modules (max: 3 sets)
- 35mm DIN rail mountable
- Debugging utility and sample software for development support are included

■ Hardware Specifications

Number of Channels	2
Counting System	24-Bit Up/Down Counter (two-phase/single-phase/single-phase with Gate Control)
Input type	Opto-Isolated (for high sink current output)
Input signals	Phase A/UP: 1 point x 2ch Phase B/DOWN: 1 point x 2ch Phase Z/CLR: 1 point x 2ch Common input: 1 point x 2ch
Response frequency	500kHz, duty: 50% (max)
Connector	FK-MC 0.5/9-ST-2.5 [PHOENIX CONTACT]

USB speed	12Mbps (Full Speed) 480Mbps (High Speed)
Additional functions	Filter, Counter coincidence pulse output
Power Consumption	5VDC 450mA (Max) *1
Dimensions (mm)	50.4(W) x 64.7(D) x 94.0(H)
Weight	100g
AC adapter (included) (POA-AD22)	AC90-264V, DC5.0V±5%, 2.0A(Max.) Length of cable: approx. 1.4m
Length of Attached Cable	1.8m

*1: Since current consumption may exceed 500mA when using extension modules, please use included AC adapter or a optional power supply.

■ Options

ACX-PAC(W32)BP	ActiveX Component Base Package (Ver.3.1 & up)
CNT24-2(FIT)GY	Opto-isolated Counter Input Extension Module 2 Input channels, Power Consumption: 5VDC 150mA (max)
POA-AD22	AC adapter (AC in: 90-264VAC, DC out: 5VDC 2.0A, Length of cable: 1.4m)
POW-AD13GY	AC-DC Power Unit (AC in: 85-132VAC, DC out: 5VDC 3.0A)
POW-AD22GY	AC-DC Power Unit (AC in: 85-264VAC, DC out: 5VDC 2.0A)
POW-DD10GY	DC-DC Power Unit (DC in: 10-30VDC, DC out: 5VDC 3.0A)
POW-DD43GY	DC-DC Power Unit (DC in: 30-50VDC, DC out: 5VDC 3.0A)

Includes API-USBP(WDM) [API Function Library]



**4 Channel 24-Bit
Up/Down Counter**

DAI12-4C(PC)



SPECIFICATIONS

Number of Channels	4	
Counting System	24-Bit Up/Down Counter (two-phase/single-phase/single-phase w/Gate Control)	
Input signals	Phase A/UP: 1 point x 4ch Phase B/DOWN: 1 point x 4ch Phase Z/CLR: 1 point x 4ch Common input: 1 point x 4ch	
Response frequency (Max.)	TTL-level input: 1MHz (duty: 50%) Opto-isolated input: 500kHz (duty: 50%)	
Timer	1msec~200sec	
Max. Count	24-bit binary data	
Input specifications	TTL-level: 1 TTL-level load Opto-isolated: 220Ω	
Interrupts	Preset value of each channel matches or TimeUp value can be set as one of IRQ3-7, 9-12, 14 or 15	
I/O address / Additional functions	Any 2-byte boundary / Filter function	
Power Consumption	5VDC 300mA (max)	
PCI Bus / Dimensions (mm)	AT Bus / 163.0(L) x 122.0(H)	
Connector	Opto-isolated input: 37-pin D-SUB female connector TTL-level input: 30-pin header male connector	
Options	Software	ACX-PAC(W32)BP, ACX-PAC(W32)AP, API-PAC(W32)
	Accessories	DTP-3(PC), DTP-4(PC), EPD-37A *1, EPD-37 *1
	Cables / Connectors	PCA37P, PCB37P, PCA37PS, PCB37PS
CE mark	○	

*1: Requires use of optional cable PCB37P or PCB37PS

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COUNTERS / MOTOR CONTROLLERS

Counters

Product Lineup / Basic Knowledge

PCI

USB

ISA

Motor
Controllers

Product Lineup / Basic Knowledge

PCI

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[Product Lineup]

● PCI / Low Profile PCI

Name	Pulse Output Type	Signal Format		Pulse rate [pps]	Encoder Input	Limit Signal			Digital I/O	Software		Page
		2-pulse	common pulse			+LIM/-LIM	Slow-down	ORG		ACX-PAC(W32)	API-PAC(W32)	
SMC-2P(PCI)	Open collector	○	○	0.1-1,000,000	○	○	○	○	Input: 7 signals/ch Output: 3 signals/ch	-	Included	D-06
SMC-4P(PCI)	Open collector	○	○	0.1-1,000,000	○	○	○	○	Input: 7 signals/ch Output: 3 signals/ch	-	Included	D-06

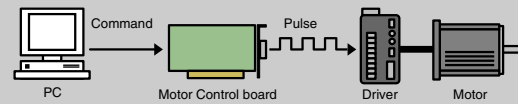
● ISA

Name	Pulse Output Type	Signal Format		Pulse rate [pps]	Encoder Input	Limit Signal			Digital I/O	Software		Page
		2-pulse	common pulse			+LIM/-LIM	Slow-down	ORG		ACX-PAC(W32)	API-PAC(W32)	
SMC-3(PCI)	Open collector	○	○	92-6M	-	○	○	○	Input: 2 signals/ch Output: 2 signals/ch	-	○	D-06

Motor controllers - Basic knowledge

1. Motor control applications

Motor controllers output pulse strings at a specified pulse number or frequency. Automatic output of control pulses can be made according to operation parameters such as target position, speed and acceleration /deceleration rates. Various input limiting functions required for positioning control are also provided. Motor controllers are used with pulse input type stepping- and servo motors.

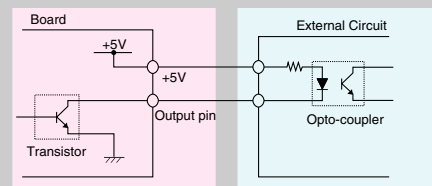


■ Pulse output circuit

Signifies the format of the pulse output circuit.

Non-isolated open collector output:

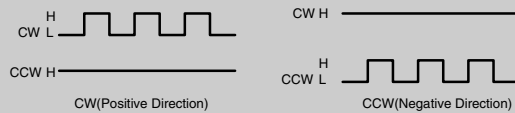
This is an output circuit where the transistor collector (open) serves as an output terminal.



■ Pulse output systems

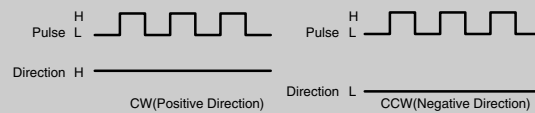
2 pulse system (Independent pulse output)

Two independent pulse signals, one for positive direction (CW), the other for negative direction (CCW), are used for control.



Common pulse system (Directional signal output)

One pulse signal controls the travel and speed while another signal determines the direction of rotation.



■ Speed range

Controllable range of speed is indicated by PPS (number of output pulses per second).

■ Encoder input signal

Boards with encoder input signals are equipped with a feedback control counter function. By connecting an incremental encoder, high-precision feedback control can be performed. Feedback is user programmable.

The input circuit supports double phase (Phase A/Phase B) and single phase (UP/DOWN).

■ Limit input signal

Detection of stop-, deceleration- and origin- point of a motor (carrier) and high-precision positioning control.

=+LIM / -LIM (Directional limit)

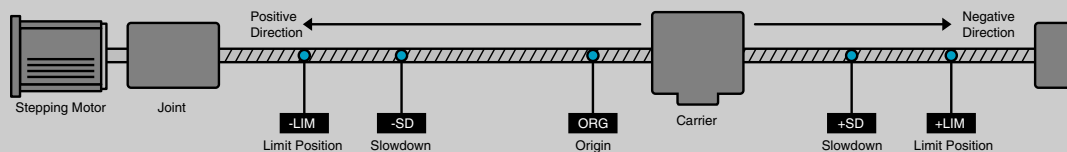
Used to detect the limit position. Stops immediately upon signal input. ("+" indicates clockwise and "-" indicates counter clockwise direction.)

=+SD/-SD (Directional slowdown)

Used to detect the starting point of deceleration during high-speed operation. Deceleration starts with signal input. ("+" indicates clockwise and "-" indicates counter clockwise direction.)

ORG (Origin limit)

Used to detect the origin. It stops with signal input.



■ General-purpose input/output signal

Digital input / output function can be used in a variety of applications such as motor control (including alarm input, signal positioning, current OFF output and counter clear signals). It can also be used for the monitoring and controlling external devices.

[COUNTERS / MOTOR CONTROLLERS] Motor Controllers-PCI / ISA

For options, please see Page J-16 (Accessories & Cables) and Page I-01 (Software). Please see Page 2-1 for PCI bus specifications.

High Speed 2 Axis Motor Controller

SMC-2P(PCI)



Includes API-PAC(W32) [API Function Library]

FEATURES

- Stepping and servo motors are easily controlled in familiar Windows environments
- Can store 1000 frames - each frame carrying required information for single positioning sequence (i.e. speed, acceleration/deceleration rate, target location)
- Can control multiple axis (max. 32) in synchronization
- Supports linear interpolation control on several axis

SPECIFICATIONS

Number of Channels	2
Pulse output	
Signal specifications	2-Pulse (CW/CCW) or Common-pulse (Pulse/Direction)
Type	Open collector
	(software selectable positive/negative logic)
Pulse rate	0.1~1M pps
Rating	35VDC 100mA
Encoder input	
Signal form	Single-phase (UP/DOWN/Z), Two-phase input (A/B/Z)
Signal type	High-speed opto-isolated
Response frequency	1MHz
Resistance	A,B: 220 Ω / Z: 510 Ω
Limit signal	
Signals / channel	3 signals / ch (ORG, +LIM, -LIM)
Signal type	Opto-isolated input (12~24VDC)
Input resistance	3kΩ

General purpose input	
Signal / channel	7 signals / ch
Signal type	Opto-isolated (12~24VDC)
Resistance	IN1, IN3-IN7: 3kΩ; IN2: 1.8kΩ
General purpose output	
Signal / channel	3 signals / ch
Signal type	Open collector
Rating	35VDC 100mA
Controller Chip	PCL5014 [NPM]
Interrupt	-
I/O address	Any 16-byte boundary
Power Consumption	5VDC 800mA (max)
Connector	PCR-E96LMD [HONDA Tsushin Kogyo] or equivalent
PCI Bus / Dimensions (mm)	32bit, 33MHz, 5V / 176.41(L) x 106.68(H)
Options	
Software	-
Accessories	CCB-SMC1 *1, EPD-96
Cables / Connectors	PCA96P, PCA96PS, PCB96P, PCB96PS, CN5-D37M

*1: Requires use of optional PCB96P or PCB96PS

High Speed 2 Axis Motor Controller

SMC-4P(PCI)



Includes API-PAC(W32) [API Function Library]

FEATURES

- Stepping and servo motors are easily controlled in familiar Windows environments
- Can store 1000 frames - each frame carrying required information for single positioning sequence (i.e. speed, acceleration/deceleration rate, target location)
- Can control multiple axis (max. 32) in synchronization
- Supports linear interpolation control on several axis

SPECIFICATIONS

Number of Channels	4
Pulse output	
Signal specifications	2-Pulse (CW/CCW) or Common-pulse (Pulse/Direction)
Type	Open collector
	(positive/negative logic is software selectable)
Pulse rate	0.1~1M pps
Rating	35VDC 100mA
Encoder input	
Signal form	Single-phase (UP/DOWN/Z), Two-phase (A/B/Z)
Signal type	High-speed opto-isolated
Response frequency	1MHz
Resistance	A,B: 220 Ω / Z: 510 Ω
Limit signal	
Signals / channel	3 signals / ch (ORG, +LIM, -LIM)
Signal type	Opto-isolated input (12~24VDC)
Input resistance	3kΩ

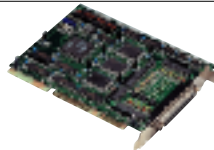
General purpose input	
Signal / channel	7 signals / ch
Signal type	Opto-isolated (12~24VDC)
Resistance	IN1, IN3-IN7: 3kΩ; IN2: 1.8kΩ
General purpose output	
Signal / channel	3 signals / ch
Signal type	Open collector
Rating	35VDC 100mA
Controller Chip	PCL5014 [NPM]
Interrupt	-
I/O address	Any 16-byte boundary
Power Consumption	5VDC 900mA (max)
Connector	PCR-E96LMD [HONDA Tsushin Kogyo] or equivalent
PCI Bus / Dimensions (mm)	32bit, 33MHz, 5V / 176.41(L) x 106.68(H)
Options	
Software	-
Accessories	CCB-SMC1 *1, EPD-96
Cables / Connectors	PCA96P, PCA96PS, PCB96P, PCB96PS, CN5-D37M

*1: Requires use of optional cable PCB96P or PCB96PS

ISA

High Speed 3 Axis Motor Controller

SMC-3(PC)



SPECIFICATIONS

Number of Channels	3
Pulse output	
Signal specifications	2-Pulse (CW/CCW) or Common pulse (Pulse/Direction)
Type	Open collector (software selectable positive/negative logic)
Pulse rate	92~6M pps
Limit signal	
Signal specifications	4 signals/ch (ORG, +LIM, -LIM)
Output type	Opto-isolated (12~24VDC)
Pulse rate	3.3k Ω
General purpose input	
Signal channels	2 input/MPG (each MPG emergency stop option is jumper selectable)
Signal type	Opto-isolated input (12~24VDC)
Input resistance	3.3k Ω
General purpose output	
Signal channels	2 signals/ch
Signal type	Open collector
Output rating	35VDC 200mA
Controller Chip	MPG1020 x 3 [MYCOM]
Interrupts	Pulse output stop or stop error (Usable 4 of IRQ3-7, 9-12, 14 or 15)
I/O address	Occupies 4 ports
Power Consumption	5VDC 600mA (max)
PCI Bus / Dimensions (mm)	37-pin D-type female connector
Connector	AT Bus / 163.0(L) x 122.0(H)
Options	
Software	API-PAC(W32)
Accessories	DTP-3(PC), DTP-4(PC), EPD-37A *1, EPD-37 *1
Cables / Connectors	PCA37P, PCB37P, PCA37PS, PCB37PS

CE mark

*1: Requires use of optional cable PCB37P or PCB37PS