

**AIO-3320/3321**  
**Isolated Analog I/O and**  
**Digital I/O Card**

**User's Manual (V1.0)**

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# Correction record

Version	Record

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# Notes on hardware installation

Please follow step by step as you are installing the control cards.

1. Be sure your system is power off.
2. Be sure your external power supply for the wiring board is power off.
3. Plug your control card in slot, and make sure the golden fingers are put in right contacts.
4. Fasten the screw to fix the card.
5. Connect the cable between the card and wiring board.
6. Connect the external power supply for the wiring board.
7. Recheck everything is OK before system power on.
8. External power on.

Congratulation! You have it.

For more detail of step by step installation guide, please refer the file “installation.pdf “ on the CD come with the product or register as a member of our user’s club at:

<http://automation.com.tw/>

to download the complementary documents.

# 1. Forward

Thank you for your selection of our PCI bus AIO-3320/3321 an isolated analog I/O, digital I/O and multi-function timer/counter card.

AIO-3320/3321 has isolated 8/16 channels analog output and isolated 8 channel analog input with programmable input range, 8 bit isolated digital input and 8 bit isolated digital output.

The extra 2 32bit timer/counter ports also provide you versatile functions such as: programmable one-shot, rate generator, square wave generator, software/hardware triggered strobe, event timer/counter, triggered timer/counter, PWM generator, .... A small card with abundant functions.

Wish you would enjoy this card!

Other analog i/o card:

AIO-3310/1/2 8/16/24 single/differential 12 bit analog input, 16 TTL I/O card (PCI bus)

AIO-3315/A 12 /16 bit Analog I/O and Digital I/O Card (PCI bus)

AIO-3322/3323 Isolated Analog I/O Card, 12bit AI x8 with triggered data acquisition, 16 bit AO x 8/16 and 16 isolated digital I/O and 2 32bit multi function timer/counter (include bracket kit for digital I/O and AO) (PCI bus)

AIO-3382 Analog I/O Card, 8 AI 2 AO, 16 TTL , 2 multi- function timer/counter card (Include bracket kit for TTL I/O) (PCI bus)

AIO-3382A/B Analog I/O Card, 8 AI 2 AO, 16 TTL , 2 multi- function timer/counter card (2 current source/ sink AO)(Include bracket kit for TTL I/O) (PCI bus)

AIO-3384 Analog I/O Card, 8 AI 4 AO, 16 TTL , 2 multi- function timer/counter card (Include bracket kit for TTL I/O) (PCI bus)

AIO-3384AA/BB Analog I/O Card, 8 AI 4 AO, 16 TTL , 2 multi- function timer/counter card (4 current source / sink AO)(Include bracket kit for TTL I/O) (PCI bus)

AIO-3384AB Analog I/O Card, 8 AI 4 AO, 16 TTL , 2 multi-function timer/counter card (2 current source AO , 2 current sink AO)(Include bracket kit for TTL I/O) (PCI bus)

AIO-6328/A 12/16 bit Analog I/O and Digital I/O PCI-104 Module

Any comment is welcome,

please visit our website: [www.automation.com.tw](http://www.automation.com.tw) for the up to date information.

## 2. Features

### 2.1 Main card

#### **General:**

2.1.1 PCI plug and play function with card ID for 16 identical cards

2.1.2 Security password blocks illegal copy of software

#### **Analog input function:**

2.1.3 Isolated 8 channel 12bit analog inputs

2.1.4 Software selectable input range: -10V~ +10V, -5V~ +5V, 0~10V, 0~5V

#### **Analog output function:**

2.1.5 Isolated 8 channel 16bit analog output (AIO-3320)  
Isolated 16channel 16bit analog output (AIO-3321)  
-10V~ +10V

#### **Digital I/O function:**

2.1.6 8 isolated digital input

2.1.7 8 isolated digital output

2.1.8 IN0, IN1 as trigger/counter in, OUT0,OUT1 as trigger out of timer/counter function

#### **Timer/Counter function:**

2.1.9 2 32bit multifunction counters with 4/33 MHz multi-clock input.

2.1.10 multi-function:

- programmable one-shot
- square wave generator
- event counter
- PWM generator

### 2.2 Din rail mounted wiring board

2.2.1 37 pin D-type connector to wiring terminals for AI0~AI7,DA0~DA7

2.2.2 25 pin D-type connector to wiring terminals for DA8~DA15

2.2.3 ADP-9201DIN for digital I/O

## 3. **Specifications**

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### 3.1 AIO-3320/3321 Main card

#### **General:**

- 3.1.1 PCI data width — 32 Bits
- 3.1.2 Card ID — 0-15 selectable.
- 3.1.3 Security password — 5 words, user configurable
- 3.1.4 Interrupt — software disable/enable
- 3.1.5 Dimension — 175(W)\*120(H)mm , 6.89(W) \* 4.72(H)in

#### **Analog input block:**

- 3.1.6 input channels — isolated 8 channel single end.
- 3.1.7 resolution — 12bit
- 3.1.8 input range — -10V~ +10V, -5V~ +5V , 0~10V, 0~5V
- 3.1.9 range selection — software selectable.
- 3.1.10 conversion speed — 13us per channel

#### **Analog output block:**

- 3.1.11 output channels — isolated 8/16 channel
- 3.1.12 resolution — 16bit
- 3.1.13 output range — -10V~ +10V
- 3.1.14 auto scan update rate — 2.1KHz

### **Digital I/O block:**

- 3.1.15 i/o channels — isolated 8DI, 8DO
- 3.1.16 output range — open collector 0~45Vdc (without wiring board)
- 3.1.17 sink current — 500mA(peak) per output bit (without wiring board)
- 3.1.18 switch speed — 20KHz (without wiring board or MOS type output)
- 3.1.19 output rating — using wiring board ADP-9201DIN series
  - 3A @250Vac,30Vdc (relay)
  - 1A @24Vdc (PMOS)
  - 2A @240Vac(SSR)

### **Timer/Counter block:**

- 3.1.20 channels — 2
- 3.1.21 data length — 32 bit
- 3.1.22 specific input — trigger in/ counter in via digital input port
- 3.1.23 specific output — trigger out / counter out via digital output port
- 3.1.24 time base — 4/33MHz
- 3.1.25 functions —
  - programmable one-shot
  - square wave generator
  - event counter
  - PWM generator

## 3.2 Din rail mounted wiring board

### **JS51026 for AI0~AI7 and DA0~DA7**

3.2.1 Connection cable — D-type 37P cable to connect main and wiring board

3.2.2 Dimension — 86(W)\*113(L)\*52(H)mm , 3.39(W)\*4.45(L)\*2.05(H)in

### **JS51050 for DA8~DA15**

3.2.3 Connection cable — D-type 25P cable to connect main and wiring board

3.2.4 Dimension — 86(W)\*79(L)\*52(H)mm , 3.39(W)\*3.11(L)\*2.05(H)in

### **JD50053 Dummy type wiring board for digital I/O**

3.2.5 Connection cable — 20P flat cable to connect main and wiring board

3.2.6 Dimension — 86(W)\*79(L)\*52(H)mm , 3.39(W)\*3.11(L)\*2.05(H)in

### **ADP-9201DIN Din rail mounted wiring board for digital I/O**

3.2.7 Connection cable — 20P flat cable to connect main and wiring board

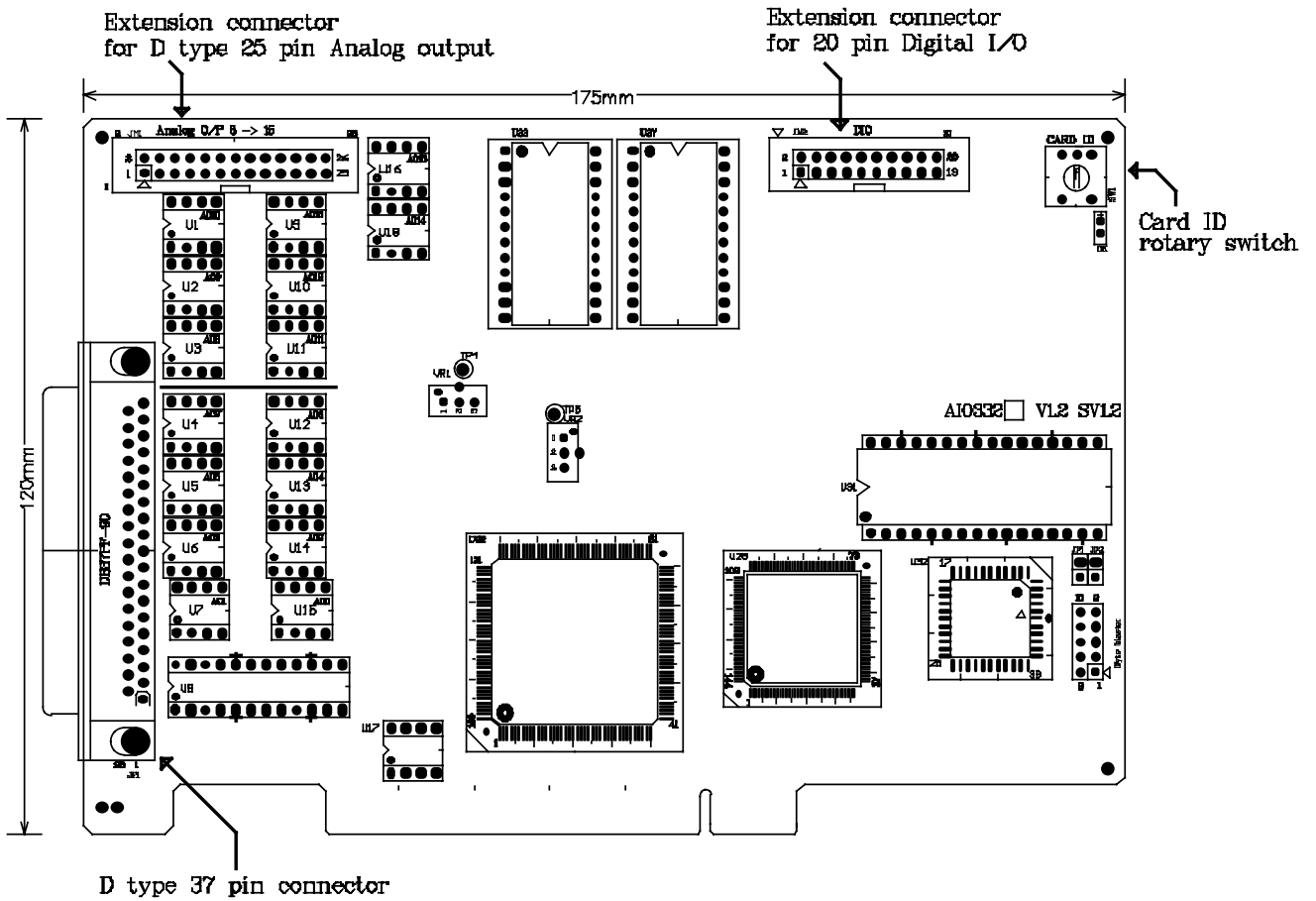
3.2.8 Dimension — ADP-9201DIN(R) / (P) : 86(W) \* 103(L) \*45(H)mm;  
3.39(W)\*4.06(L)\*1.77(H)in  
— ADP-9201DIN(S) : 86(W) \* 103(L) \*50(H)mm  
3.39(W)\*4.06(L)\*1.97(H)in

3.2.9 indicators — LED, power x 1, digital input x 8, digital output x8

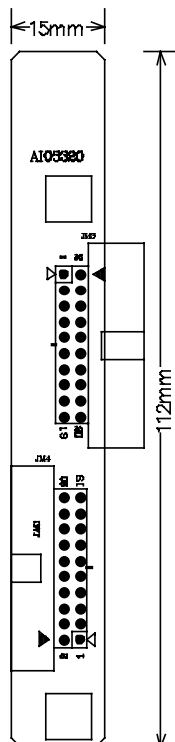
3.2.10 output rating — 3A @250Vac,30Vdc (relay)  
1A @24Vdc (PMOS)  
2A @240Vac(SSR)

## 4. Layout and dimensions

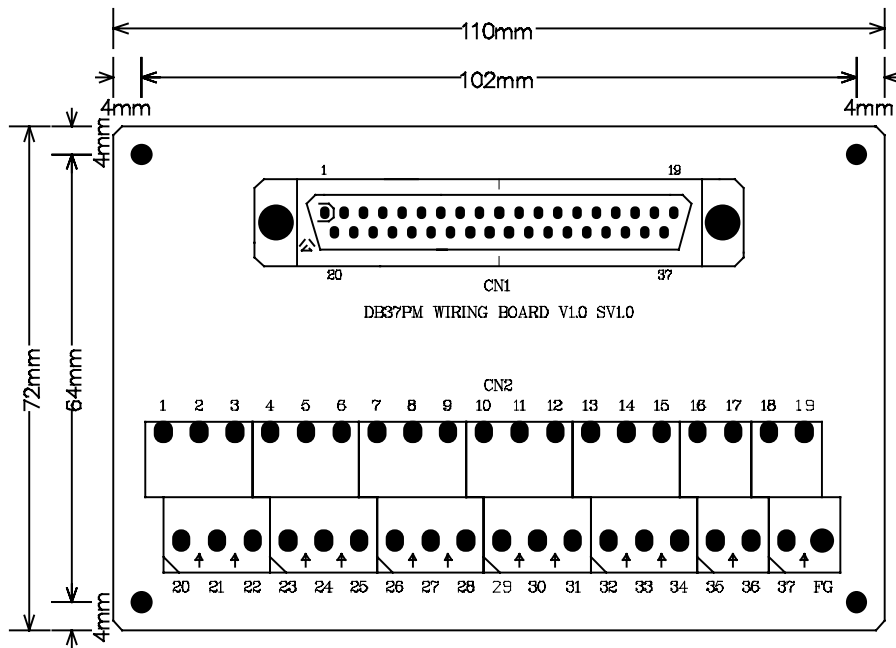
### 4.1 AIO3320/3321 Main card



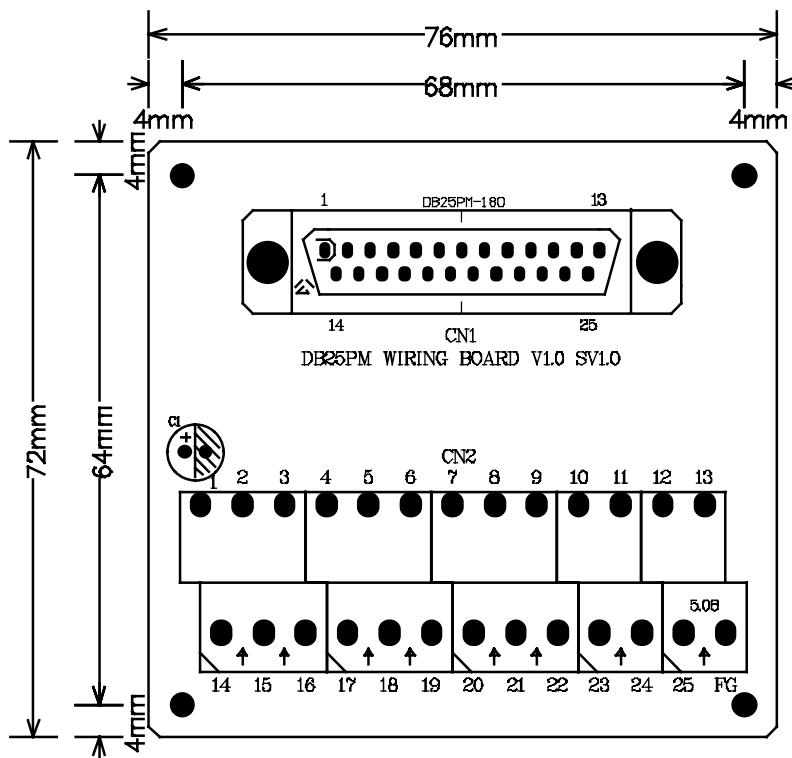
### 4.2 AIO3320/3321 Digital I/O extension card



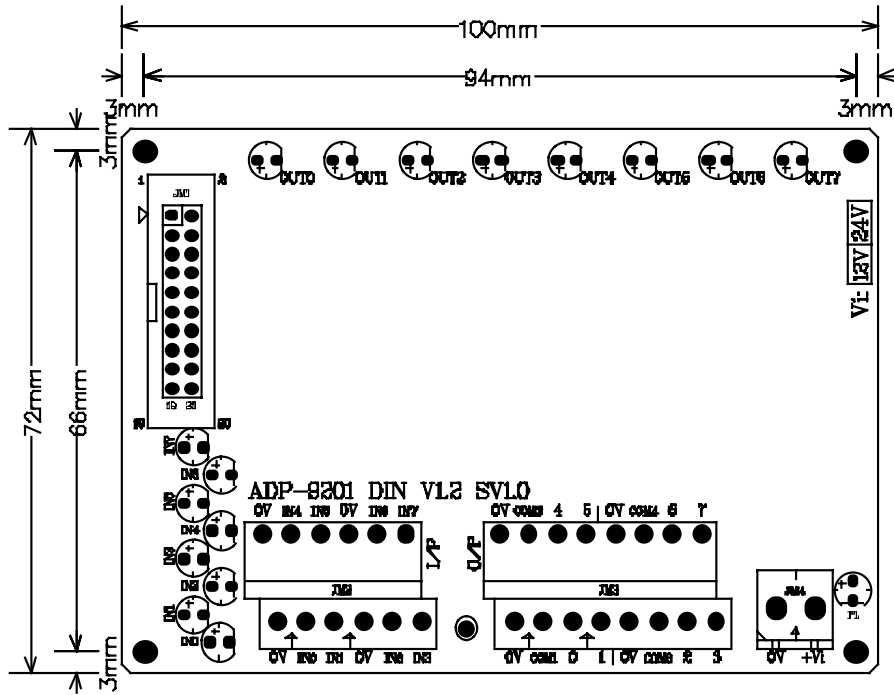
### 4.3 JS51026 37P Din rail mounted dummy wiring board



### 4.4 JS51050 25P Din rail mounted dummy wiring board



#### 4.5 ADP-9201DIN Din rail mounted wiring board



## 5. Pin definitions

### 5.1 Pin definitions for on card 37P connector

PIN	DESCRIPTIONS		PIN	DESCRIPTIONS	
1	AI0:analog input 0	AI0	1	20	AGND
2	AI1:analog input 1	AI1	2	21	AGND
3	AI2:analog input 2	AI2	3	22	AGND
4	AI3:analog input 3	AI3	4	23	AGND
5	AI4:analog input 4	AI4	5	24	AGND
6	AI5:analog input 5	AI5	6	25	AGND
7	AI6:analog input 6	AI6	7	26	AGND
8	AI7:analog input 7	AI7	8	27	AGND
9	DA0:analog out0	DA0	9	28	AGND
10	DA1:analog out1	DA1	10	29	AGND
11	DA2:analog out2	DA2	11	30	AGND
12	DA3:analog out3	DA3	12	31	AGND
13	DA4:analog out4	DA4	13	32	AGND
14	DA5:analog out5	DA5	14	33	AGND
15	DA6:analog out6	DA6	15	34	AGND
16	DA7:analog out7	DA7	16	35	+5Vout
17	+5Vda: 5V out*	+5Vout	17	36	N.C
18	NC	N.C	18	37	N.C
19	NC	N.C	19		
			20		AGND: analog ground
			21		AGND: analog ground
			22		AGND: analog ground
			23		AGND: analog ground
			24		AGND: analog ground
			25		AGND: analog ground
			26		AGND: analog ground
			27		AGND: analog ground
			28		AGND: analog ground
			29		AGND: analog ground
			30		AGND: analog ground
			31		AGND: analog ground
			32		AGND: analog ground
			33		AGND: analog ground
			34		AGND: analog ground
			35		+5Vda: 5V out*
			36		NC
			37		NC

**NOTE:** +5Vda: a 5V output for user's application such as power of a trimmer, the voltage is isolated from the PC but the same ground with AGND.

## 5.2 Pin definitions for extension 25P connector

PIN	DESCRIPTIONS		PIN	DESCRIPTIONS
1	AGND: analog ground		14	AGND: analog ground
2	DA8: analog output8		15	AGND: analog ground
3	DA9: analog output9		16	AGND: analog ground
4	DA10: analog output10		17	AGND: analog ground
5	DA11: analog output11		18	AGND: analog ground
6	DA12: analog output12		19	AGND: analog ground
7	DA13: analog output13		20	AGND: analog ground
8	DA14: analog output14		21	AGND: analog ground
9	DA15: analog output15		22	AGND: analog ground
10	AGND: analog ground		23	+15V*
11	+15V*		24	-15V*
12	+15V*		25	-15V*
13	-15V*			

**NOTE:** +15V and -15V are voltage output for user's application such as power of a trimmer, the voltage is isolated from the PC but the same ground with AGND.

## 5.3 Pin definitions for extension 20P connector

PIN	DESCRIPTIONS		PIN	DESCRIPTIONS
1	EXT_IN0: input0		2	EXT_OUT0: output0
3	EXT_IN1: input1		4	EXT_OUT1: output1
5	EXT_IN2: input2		6	EXT_OUT2: output2
7	EXT_IN3: input3		8	EXT_OUT3: output3
9	EXT_IN4: input4		10	EXT_OUT4: output4
11	EXT_IN5: input5		12	EXT_OUT5: output5
13	EXT_IN6: input6		14	EXT_OUT6: output6
15	EXT_IN7: input7		16	EXT_OUT7: output7
17	DGND: digital ground		18	DGND: digital ground
19	+24Ve: external input power supply		20	+24Ve: external input power supply

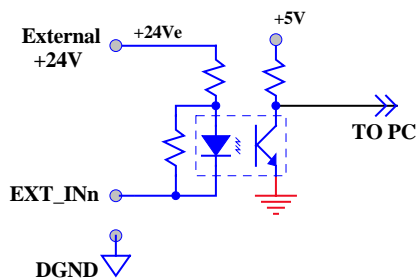
## 6. Hardware descriptions

### 6.1 Card ID setting

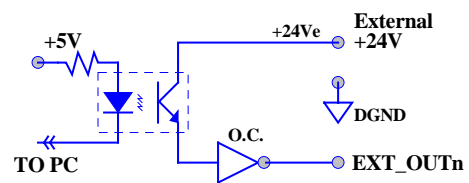
Since PCI cards have plug and play function, the card ID is required for programmer to identify which card he/she will control without knowing the physical address assigned by the Windows (OS). A 16 position rotary switch for extinguishing the 16 identical cards.

### 6.2 Digital I/O

There is one isolated input port and one isolated output port on card. The interface diagram is as follows.



I/P diagram



O/P diagram

IN0,IN1 and OUT0,OUT1 can be configured as dedicated i/o for timer/counters (refer to software manual).

### 6.3 Timer/Counter

There are 2 timer/counters on board. Each one has 32 bit register length, if you program as PWM mode, the register is divided as 2 16 bit width, the upper 16 bit work as the pulse high width and the lower 16 bit work as PWM frequency register . The card also provide end of count interrupt function of both the timer/counters.

### 6.4 Analog input

There are 8 channels of analog input on card, which are electric isolated from PC . The hardware may accept 0-5V, 0-10V, -5V-+5V, -10V - +10V range according you configuration.

### 6.5 Analog output

There are 8/16 channels of analog output on card, which are electric isolated from PC and scanned by hardware without occupying PC's resource. The output of DA is 16 bit width and -10V ~+10V range.

## 7. Applications

### 7.1 Analog input section:

For measurement of analog signal such as:

- temperature
- voltage
- current
- flow
- light
- ....

**Note: The analog signal should be pre-processed to the acceptable range of the card.**

### 7.2 Analog output section:

For control or signal generation such as:

- inverter speed
- servo motor speed
- wave generation
- valve control
- light control
- ....

### 7.3 Digital section:

For the control of digital i/o:

- switch input
- relay control
- trigger output
- ...

### 7.4 Counter/Timer section:

- event counting
- periodic interrupt source
- PWM generator (can work as D/A with external low pass filter)
- counter/timer with trigger out
- duration counter

## 8. Ordering information

<u>PRODUCT</u>	<u>DESCRIPTIONS</u>
AIO-3320	Isolated Analog I/O Card, 8 channels analog input, 8 channels analog output and 16 isolated digital I/O and multi function timer/counter (include bracket kit for digital I/O )
AIO-3321	Isolated Analog I/O Card, 8 channels analog input, 16 channels analog output and 16 isolated digital I/O and multi function timer/counter (include bracket kit for digital I/O )
JS51026	Dummy DIN rail mounted wiring board (D-type 37P to terminals)
JS51050	Dummy DIN rail mounted wiring board (for JM1) (AIO-3321 only)
JD50053	Dummy DIN rail mounted wiring board (for JM2)
ADP-9201DIN(R)	DIN rail mounted wiring board with 16 i/o LED indicators and relay output for 8 DI, 8DO. (for JM2)
ADP-9201DIN(P)	DIN rail mounted wiring board with 16 i/o LED indicators and PMOS output for 8 DI, 8DO. (for JM2)
ADP-9201DIN(S)	DIN rail mounted wiring board with 16 i/oLED indicators and SSR output for 8 DI, 8DO. (for JM2)
M270337X0	D type 37p male-female cable 1.5M
M270337X0S	D type 37p male-female cable 1.5M, shielding
M270337X2	D type 37p male-female cable 3.0M
M270337X2S	D type 37p male-female cable 3.0M, shielding
M270325X4	D type 25p male-female cable 1.5M (for AIO-3321 only)
M270325X4S	D type 25p male-female cable 1.5M, shielding (for AIO-3321 only)
M270325X0	D type 25p male-female cable 3.0M (for AIO-3321 only)
M270325X0S	D type 25p male-female cable 3.0M, shielding (for AIO-3321 only)
M23207	20 pin flat cable 1.5M
M23209	20 pin flat cable 3.0M
SM23404	Extension kit for JM1 (bracket for 25p D-type connector , 26p flat cable) (3321 only)