AIO3310/1/2A
Analog Input and
Multi-Function Digital I/O Card

User's Manual (V1.0)

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Correction record

Version	Record

Contents

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 AIO3310/1/2A a multi-channel analog input, and multi-function digital i/o and timer/counter card.

An analog input card maybe as simply as just signal conversion, and the calibration job will be the burden of the users. AIO3310A provides a new approach that each channel has been calibrated with our precision instruments and all the records kept in the on-card eeprom to give the users a transparent environment of accurate result at low card price.

Except for the calibration features, 2 byte-wide programmable TTL I/O ports also give users more flexible functions to integrate the whole system.

Two 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, ….

Wish you would enjoy this card!

Other analog i/o card:
   AIO3315/A   12/16 bit Analog I/O and Digital I/O Card (PCI bus)
   AIO3320/3321   isolated 8 12 bit A/D, isolated 8/16 16 bit D/A with 16 isolated digital I/O
               (PCI bus)
   AIO3322/3323   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)
   AIO3382   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)
   AIO3382A/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)
   AIO3384   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)
   AIO3384AA/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)
   AIO3384AB   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)
   AIO6328/A   12/16 bit Analog I/O and Digital I/O PCI-104 Module

Any comment is welcome, please visit our website
http://www.automation.com.tw/
http://www.automation-js.com/   for the up to date information.

2. Features

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 function:

2.1.3   8/16/24 channel 16bit analog inputs (standard:8 channels)

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

2.1.5   Factory pre-calibrated analog conversion accuracy

Digital I/O function:

2.1.6   2 byte-wide programmable TTL I/O

2.1.7   IO00, IO01 as trigger/counter in, IO10,IO11 as trigger out of timer/counter function

Timer/Counter function:

2.1.8   2 32bit multifunction counters up to 33MHz

2.1.9   multi-function:

        -- programmable one-shot

        -- square wave generator

        -- event counter

        -- PWM generator

3. Specifications

3.1 AIO3310A Main card

General:

3.1.1   PCI data width — 32 Bits

3.1.2   Card ID — 4 bits

3.1.3   Security password — 10 bytes, user configurable

3.1.4   Interrupt — software disable/enable

3.1.5   Dimension — 156(W)*112(H)mm , 6.2(W) * 4.5(H)in

Analog block:

3.1.6   input channels — 8/16/24 channel single end or differential (standard:8 channels)

3.1.7   resolution — 16bit

3.1.8   input range — -10V~ +10V,   -5V~ +5V , 0~10V, 0~5V

3.1.9   range selection — software selectable per chip

3.1.10   conversion speed — 6us per chip (8 channel per chip)

3.1.11   accuracy — full range within 5mV (after calibration)

Digital I/O block:

3.1.12   i/o channels — 16 TTL (port0,port1)

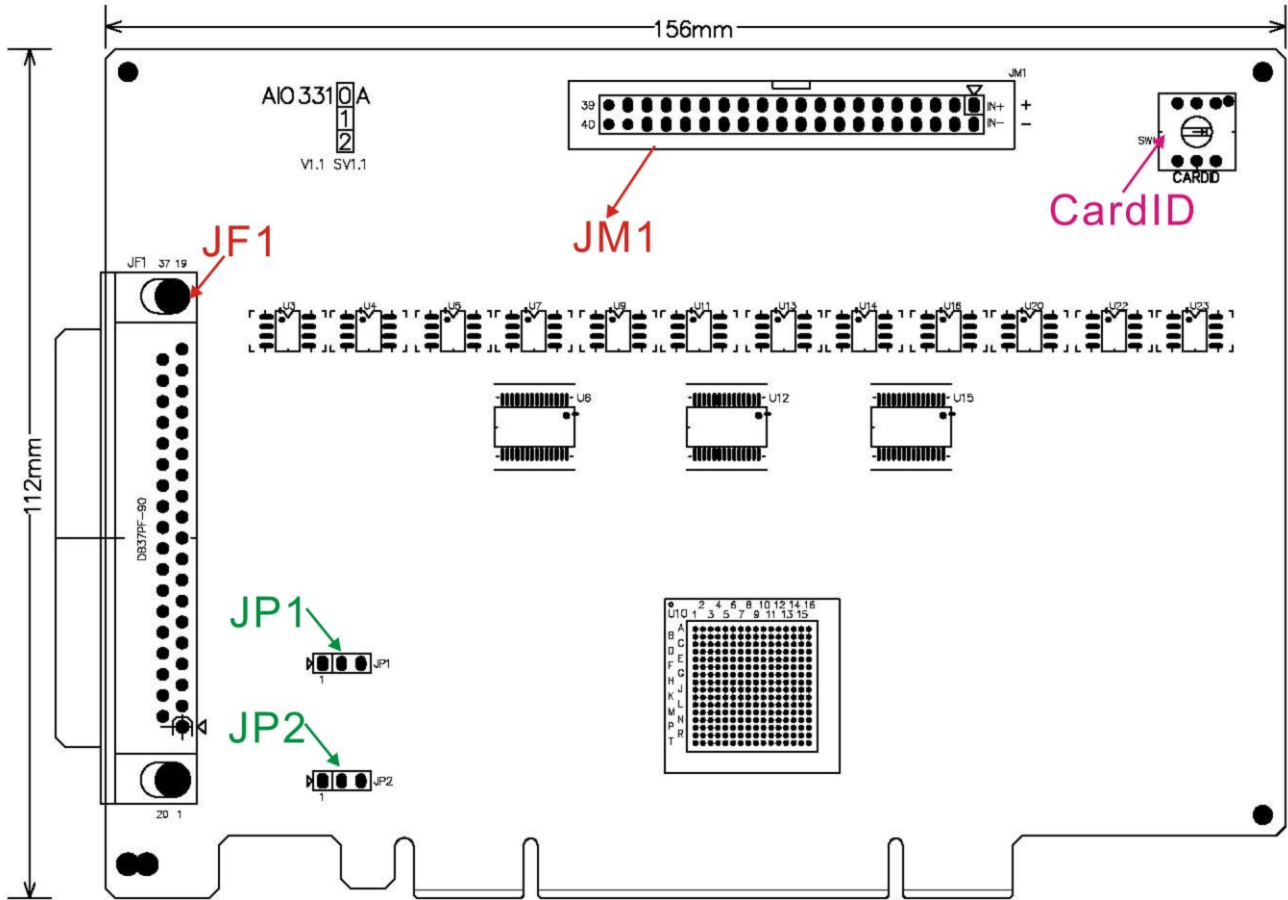3.1.13   configuration — byte input /output

Timer/Counter block:

3.1.14   channels — 2

3.1.15   data length — 32 bit

3.1.16   specific input — trigger in/ counter in via digital I/O port0

3.1.17   specific output — trigger out / counter out via digital I/O port 1

3.1.18   time base — PCI system clock (33/66MH)

3.1.19   functions —

        -- programmable one-shot

        -- square wave generator

        -- event counter

        -- PWM generator

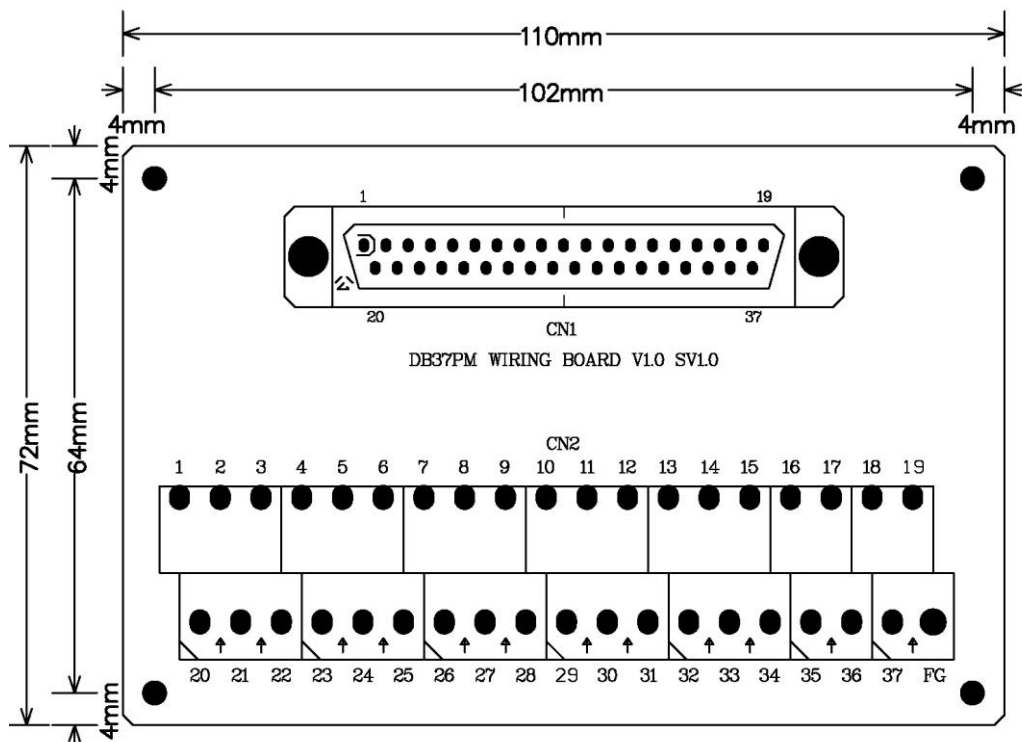3.2 JS51026   37P Din rail mounted dummy wiring board

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

3.2.2   Dimension — 90(W)*113(L)*60(H)mm , 3.6(W)*4.5(L)*2.4(H)in

4. Layout and dimensions

4.1 AIO3310/1/2A Main card

4.2 JS51026 37PM Din rail mounted dummy wiring board

5. Pin definitions

5.1 Pin definitions for JF1 (on card 37P) connector

PIN	DESCRIPTIONS		PIN	DESCRIPTIONS
1	IO00: TTL port0 bit0 trigger in of counter0		20	IO01: TTL port0 bit1 trigger in of counter1
2	IO02: TTL port0 bit2		21	IO03: TTL port0 bit3
3	IO04: TTL port0 bit4		22	IO05: TTL port0 bit5
4	IO06: TTL port0 bit6		23	IO07: TTL port0 bit7
5	IO10: TTL port1 bit0 trigger out of counter0/timer0		24	IO11: TTL port1 bit1 trigger out of counter1/timer1
6	IO12: TTL port1 bit2		25	IO13: TTL port1 bit3
7	IO14: TTL port1 bit4		26	IO15: TTL port1 bit5
8	IO16: TTL port1 bit6		27	IO17: TTL port1 bit7
9	AI0+: analog in0+		28	AI0-: analog in0-
10	AI1+: analog in1+		29	AI1-: analog in1-
11	AI2+: analog in2+		30	AI2-: analog in2-
12	AI3+: analog in3+		31	AI3-: analog in3-
13	AI4+: analog in4+		32	AI4-: analog in4-
14	AI5+: analog in5+		33	AI5-: analog in5-
15	AI6+: analog in6+		34	AI6-: analog in6-
16	AI7+: analog in7+		35	AI7-: analog in7-
17	+5V (out)		36	GND
18	GND		37	-15Ve (out)
19	+15Ve (out)			

NOTE: For single end input application, one end of differential input terminal should wire to ground, Say AI0 for example, AI0- should wire to ground for single end input application.
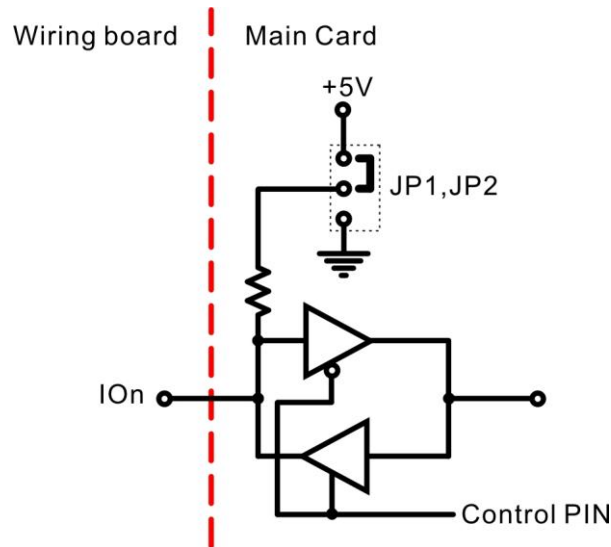
NOTE: AI0~AI7 is on chip 1.

5.2 Pin definitions for JM1 (extension 37P) connector

PIN	DESCRIPTIONS	PIN	DESCRIPTIONS
1	AI8+: analog in8+	20	AI8-: analog in8-
2	AI9+: analog in9+	21	AI9-: analog in9-
3	AI10+: analog in10+	22	AI10-: analog in10-
4	AI11+: analog in11+	23	AI11-: analog in11-
5	AI12+: analog in12+	24	AI12-: analog in12-
6	AI13+: analog in13+	25	AI13-: analog in13-
7	AI14+: analog in14+	26	AI14-: analog in14-
8	AI15+: analog in15+	27	AI15-: analog in15-
9	AI16+: analog in16+	28	AI16-: analog in16-
10	AI17+: analog in17+	29	AI17-: analog in17-
11	AI18+: analog in18+	30	AI18-: analog in18-
12	AI19+: analog in19+	31	AI19-: analog in19-
13	AI20+: analog in20+	32	AI20-: analog in20-
14	AI21+: analog in21+	33	AI21-: analog in21-
15	AI22+: analog in22+	34	AI22-: analog in22-
16	AI23+: analog in23+	35	AI23-: analog in23-
17	+5V (out)	36	GND
18	GND	37	-15Ve (out)
19	+15Ve (out)		

Connector diagram (JM1, 37P):

Left	Pin	Pin	Right
AI8+	1		
AI9+	2	20	AI8-
AI10+	3	21	AI9-
AI11+	4	22	AI10-
AI12+	5	23	AI11-
AI13+	6	24	AI12-
AI14+	7	25	AI13-
AI15+	8	26	AI14-
AI16+	9	27	AI15-
AI17+	10	28	AI16-
AI18+	11	29	AI17-
AI19+	12	30	AI18-
AI20+	13	31	AI19-
AI21+	14	32	AI20-
AI22+	15	33	AI21-
AI23+	16	34	AI22-
+5Vout	17	35	AI23-
GND	18	36	GND
+15Vout	19	37	-15Vout

NOTE: For single end input application, one end of differential input terminal should wire to ground, Say AI8 for example, AI8- should wire to ground for single end input application.
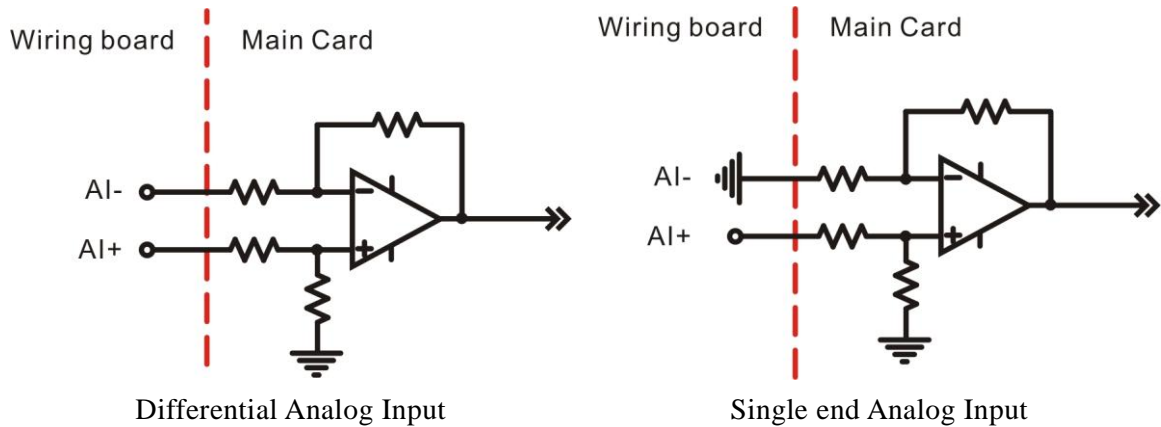
6. I/O interface diagram

6.1 Digital I/O diagram

For byte-programmable TTL I/O IO00 ~ IO07, IO10 ~ IO17 to configured as pull high or pull low. JP1,JP2 are used for output state of power on. (refer 7.3 JP1,JP2 Jumper setting)
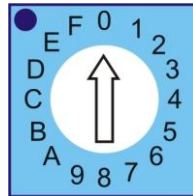
6.2 Analog I/O diagram

Differential Analog Input

Single end Analog Input

7. Hardware descriptions

7.1 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 is used for extinguishing the 16 identical cards.
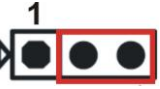

7.2 Digital I/O

The 2 byte-programmable TTL I/O can be used as input or output depending on your configuration. But when you use the timer / counter trigger output mode the port1 is must configure as output and bit0 is timer0/counter0 trigger out, bit1 is timer1/counter1 trigger out.

If you use trigger input mode of counter the port0 must configure as input port and bit0 as counter0 input, bit1 as counter1 input.

7.3 JP1,JP2 Jumper setting

The TTL I/O can be configured as pull high or pull low by jumper setting.

1-2 short Pull High	2-3 short Pull Low

7.4 Timer/Counter

There 2 timer/counter's 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.

7.5 Analog input

There are maximum 24 channels of analog input on card, which are divided in 3 A/D chips. Depends on your selection, 8/16/24 channels are available. The hardware may accept 0-5V, 0-10V, -5V-+5V,   -10V - +10V range on per chip basis.

8. Applications

8.1 Analog 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.

8.2 Digital section:

For the control of digital i/o:

- switch input

- relay control

- trigger output

- ...

Note: The digital signal should be pre-processed to the TTL level

.

8.3 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

9. Ordering information

PRODUCT	DESCRIPTIONS
AIO3310A	Analog I/O Card 8 channels analog input ,16 TTL I/O and multi function timer/counter
AIO3311A	Analog I/O Card 16 channels analog input ,16 TTL I/O and multi function timer/counter
AIO3312A	Analog I/O Card 24 channels analog input ,16 TTL I/O and multi function timer/counter
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
JS51026	DIN rail mounted dummy wiring board (D-type 37P to terminals)
SM23403	Extension kit (for 3311/3312A only)