

MPC3042A/3042AL

2-Axis Motion Control Card

User's Manual (V1.1)

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Correction record

Version	Record
1.0	For driver 1.0 up
1.0->1.1	Modify 2. Feature-Delete Software key function

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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 2-axis motion control card. This card adopt the ASIC chip with complex motion functions including point to point, linear and circular interpolation, linear and s-curve acceleration/deceleration and several miscellaneous functions. Dll's of various functions will save you a lot of time in the motion related projects.

Our other motion control products:

- MPC3024 4 axes linear/circular/point to point (standard function) motion control card (PCI bus)
- MPC3028 8 axes linear/circular/point to point (standard function) motion control card (PCI bus)
- MPC3034 advanced 4 axes linear/circular/point to point (standard function) motion control card (PCI bus)
- MPC3035 4 axes linear/circular/point to point (standard function) with advanced encoder counter function / with 2 8bit DA's motion control card (PCI bus)
- MPC3035L 4 axes linear/circular/point to point (standard function) with advanced encoder counter function motion control card (PCI bus)

Any comment is welcome,

please visit our website

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

<http://www.automation-js.com/> for the up to date information.

Note: MPC3042AL is the functional replacement of MPC3042.

2. Features

2.1 Main card

- 2.1.1 2-axis servo/stepping motor control
- 2.1.2 2 28-bit up/down counter for incremental encoder
- 2.1.3 2 28-bit up/down counter for pulse handler input
- 2.1.4 Pulse output rate up to 6.55MHz
- 2.1.5 Pulse output options : OUT/DIR,CW/CCW
- 2.1.6 linear interpolation
- 2.1.7 circular interpolation
- 2.1.8 S curve or T curve acceleration / deceleration in interpolation and positioning
- 2.1.9 Continuous interpolation
- 2.1.10 Speed change on-the-fly
- 2.1.11 Synchronized start motion
- 2.1.12 Position latch function
- 2.1.13 Simultaneously start/stop on multi-axes
- 2.1.14 Programmable interrupt conditions
- 2.1.15 Backlash compensation
- 2.1.16 Software limit switches protection
- 2.1.17 Motion parameters change on the fly
- 2.1.18 8 bit PWM DA
- 2.1.19 32 bit timer
- 2.1.20 2 channel 7 bit DA with digital PI control of speed and position loop. (MPC3042A only)
- 2.1.21 Feedback encoder failure detection (MPC3042A only)

2.2 Din rail mounted wiring board

- 2.2.1 JS51050 dummy wiring board for JM4 pulse handler interface
- 2.2.2 ADP2042DIN wiring board for JF1 motion control interface
- 2.2.3 ADP9201DIN for ADP9201_JM1 isolated digital I/O interface

3. Specifications

3.1 MPC3042A/3042AL Main card

Motion

- 3.1.1 Max pulse rate — 6,553,500 pps
- 3.1.2 Pulse output mode — Single phase: CLOCK, DIR
Dual phase : CW, CCW
- 3.1.3 Acceleration / Deceleration mode — linear ,S-curve mode
- 3.1.4 Homing mode — 14 types
- 3.1.5 Encoder up/down counter — 2 28bit counter
- 3.1.6 Pulse Handle up/down counter — 2 28 bit counter
- 3.1.7 Linear interpolation
- 3.1.8 Circular interpolation
- 3.1.9 17 bit DA with digital PI control (MPC3042A only)

Digital I/O

- 3.1.10 Motion specific input — SRDY, ALM, LS+(EL+), LS-(EL-), SD, HOME(ORG),
PCS, LTC, INP, STA per axis, EMG per card
- 3.1.11 Motion specific output — CMP,SVON,ERC,FIN per axis
- 3.1.12 General input — 8 bit, photo isolated
- 3.1.13 General output — 8 bit, photo isolated
- 3.1.14 TTL I/P — 8 bits

Special I/O

- 3.1.15 D/A — 8 bits, 0-10Vdc (PWM DA)
- 3.1.16 D/A — 17 bits, -10V~ +10V (MPC3042A only, if not use for motion)

General

- 3.1.17 Card ID — 16 position rotary switch
- 3.1.18 Insulation resistance — 100 M Ω (min) at 1000Vdc
- 3.1.19 Isolation voltage — 2500Vac 1Min
- 3.1.20 I/O connector — 68pin female SCSI-II centronic connector
25p D type connector
- 3.1.21 External supply — DC 24 \pm 4V
- 3.1.22 Operation temperature — 0 to 70° C
- 3.1.23 Storage temperature — -20 to 80° C
- 3.1.24 Operation humidity — 5~95% RH, non-condensing
- 3.1.25 Dimensions — 175(W) * 122(H) mm , 6.9(W) * 4.8(H)in

3.2 Din rail mounted wiring board

ADP2042DIN for JF1 motion control interface

- 3.2.1 Power Requirement — 24Vdc \pm 4Vdc
- 3.2.2 On Board Build-in s.p.s. — +5Vdc 500mA (max)
- 3.2.3 General input — 2 with LED indicator
- 3.2.4 Output capacity — 4 NMOS output, 1A continuous \cdot 120Vdc(max)
Option : 4 PMOS output, 1A continuous \cdot 24Vdc(max)
Option : 4 Relay output, 3A continuous \cdot 250Vac(max)
- 3.2.5 Connection — SCSI-II 68 pin cable to connect main and wiring board
- 3.2.6 Specific servo control connectors — 2 D-type 26p (1 per axis)
- 3.2.7 Operation temperature — 0 to 70° C
- 3.2.8 Operation humidity — RH5~95%, non-condensed
- 3.2.9 Dimension — ADP2042DIN(R) / (P) : 121(W)*159(L)*45(H)mm ;
4.8(W)*6.3(L)*1.8(H)in
ADP2042DIN(N) : 121(W)*159(L)*47(H)mm ;
4.8(W)*6.3(L)*1.9(H)in

JS51050 for JM4 pulse handler interface

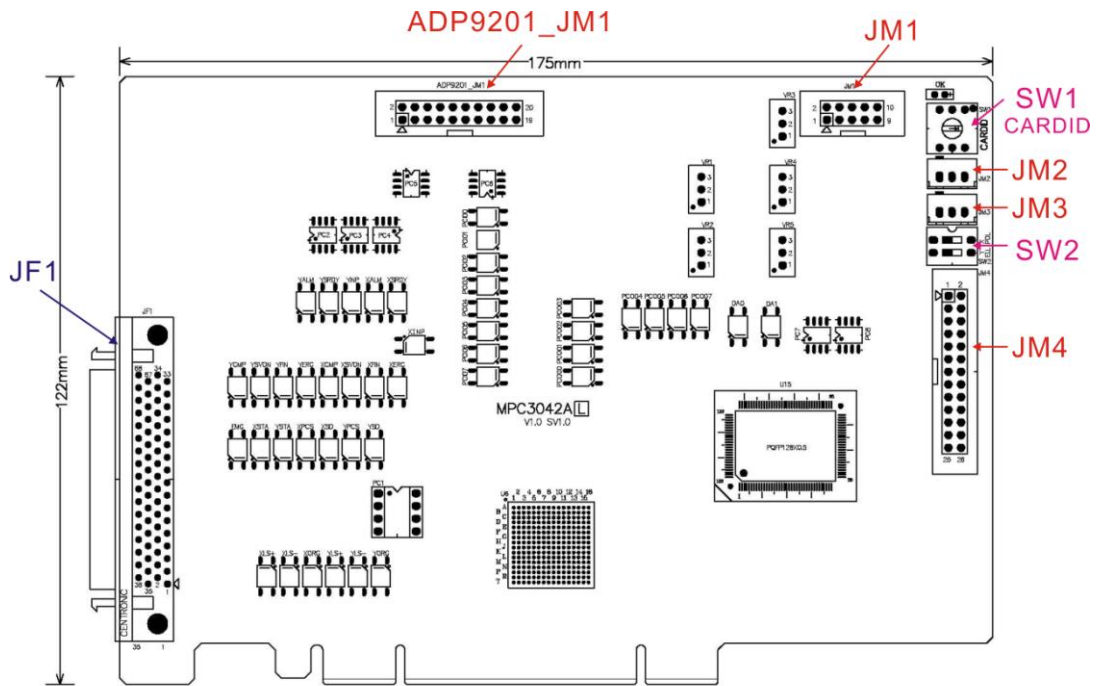
- 3.2.10 Connection cable — D-type 25P cable to connect main and wiring board
- 3.2.11 Dimension — 86(W)*79(L)*52(H)mm, 3.4(W)*3.2(L)*2.1(H)in

ADP9201DIN for ADP9201 JM1 isolated digital I/O

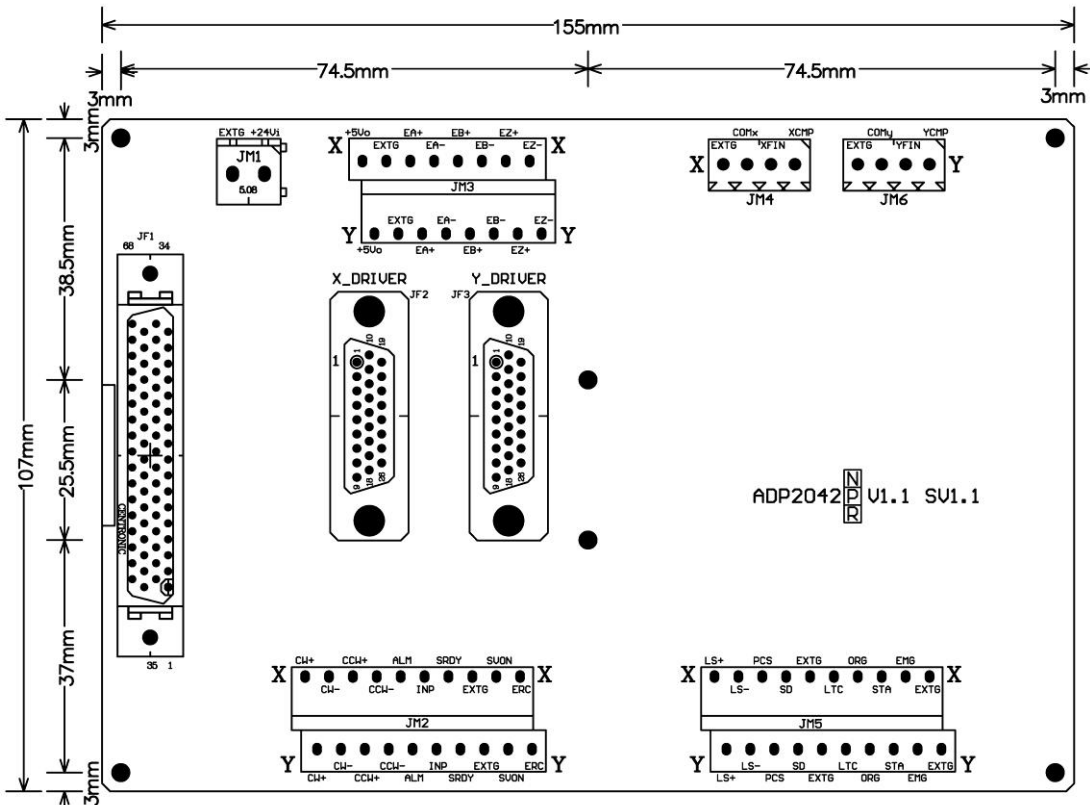
- 3.2.12 Power Requirement — 24Vdc \pm 4Vdc
- 3.2.13 Indicator — 8 input and 8 output LED indicators
- 3.2.14 Output capacity — 8 relay output, 3A @250Vac , 3A @30Vdc
Option : 8 PMOS output, 1A @24Vdc
Option : 8 SSR output, 2A@250Vac
- 3.2.15 Connector — 20pin
- 3.2.16 Operation temperature — 0 to 70° C
- 3.2.17 Operation humidity — RH5~95%, non-condensed
- 3.2.18 Dimension — ADP9201DIN(R) / (P) : 86(W) * 103(L) *45(H)mm;
3.4(W)*4.1(L)*1.8(H)in
ADP9201DIN(S) : 86(W) * 103(L) *50(H)mm
3.4(W)*4.1(L)*2.0(H)in

4. Layout and dimension

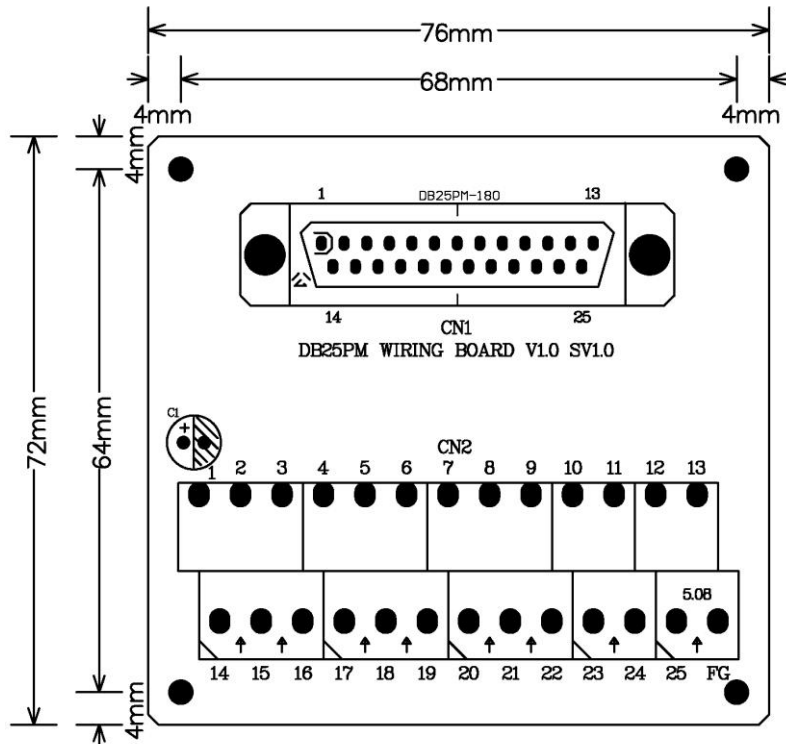
4.1 MPC3042A/3042AL Main card



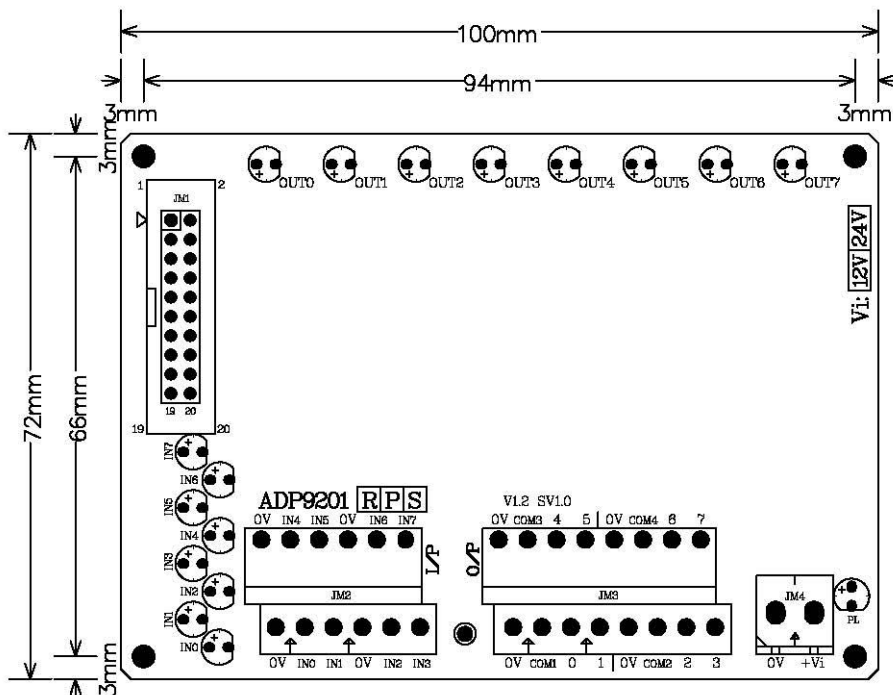
4.2 ADP2042DIN for JF1 Din rail mounted wiring board



4.3 JS51050 for JM4 25PM Din rail mounted dummy wiring board



4.4 ADP9201DIN for ADP9201_JM1 Din rail mounted wiring board



5. Pin definitions

5.1 JF1 Assignment / Definitions

+24Vin	1	35	EXTG
+24Vin	2	36	EXTG
EXTG	3	37	+5Vout
EXTG	4	38	+5Vout
EXTG	5	39	EXTG
XLS+	6	40	YLS+
XLS-	7	41	YLS-
XORG	8	42	YORG
XLTC	9	43	YLTC
XSD	10	44	YSD
XPCS	11	45	YPCS
EMG	12	46	EMG
XFIN	13	47	YFIN
XCMP	14	48	YCMP
XSTA	15	49	YSTA
EXTG	16	50	EXTG
XINP	17	51	YINP
XALM	18	52	YALM
XSRDY	19	53	YSRDY
XSVON	20	54	YSVON
XERC	21	55	YERC
EXTG	22	56	EXTG
XCW+	23	57	YCW+
XCW-	24	58	YCW-
XCCW+	25	59	YCCW+
XCCW-	26	60	YCCW-
EXTG	27	61	EXTG
XEA+	28	62	YEA+
XEA-	29	63	YEA-
XEB+	30	64	YEB+
XEB-	31	65	YEB-
XEZ+	32	66	YEZ+
XEZ-	33	67	YEZ-
EXTG	34	68	EXTG

PIN	I/O	Descriptions	PIN	I/O	Descriptions
1	I	+24V External DC24V power input	35	I	EXTG Common for external power (+24V and +5V)
2	I	+24V External DC24V power input	36	I	EXTG Common for external power (+24V and +5V)
3	I	EXTG Common for external power (+24V and +5V)	37	O	+5Ve Output of on board DC/DC converter
4	I	EXTG Common for external power (+24V and +5V)	38	O	+5Ve Output of on board DC/DC converter
5	I	EXTG Common for external power (+24V and +5V)	39	I	EXTG Common for external power (+24V and +5V)
6	I	XLS+(XEL+) Positive over travel LS input of X axis	40	I	YLS+(YEL+) Positive over travel LS input of Y axis
7	I	XLS-(XEL-) Negative over travel LS input of X axis	41	I	YLS-(YEL-) Negative over travel LS input of Y axis
8	I	XHOME (XORG) HOME(Origin) LS(EL) input of X axis	42	I	YHOME (YORG) HOME(Origin) LS(EL) input of Y axis
9	I	XLTC Latch counter trigger input of X axis	43	I	YLTC Latch counter trigger input of Y axis
10	I	XSD Slowdown LS(EL) input of X axis	44	I	YSD Slowdown LS(EL) input of Y axis
11	I	XPCS Position change start signal input of X axis	45	I	YPCS Position change start signal input of Y axis
12	I	EMG Emergency stop, stop all axes	46	I	EMG Emergency stop, stop all axes
13	O	XFIN General purpose output of X axis	47	O	YFIN General purpose output of Y axis
14	O	XCMP General out or compare out of X axis	48	O	YCMP General out or compare out of Y axis
15	I	XSTA Start motion signal input for X axis	49	I	YSTA Start motion signal input for Y axis
16	I	EXTG Common for external power (+24V and +5V)	50	I	EXTG Common for external power (+24V and +5V)
17	I	XINP General I/p of X axis	51	I	YINP General I/p of Y axis
18	I	XALM ALARM I/p of X axis	52	I	YALM ALARM I/p of Y axis
19	I	XSRDY Servo Ready signal of X axis	53	I	YSRDY Servo Ready signal of Y axis
20	O	XSVON Servo on of X axis	54	O	YSVON Servo on of Y axis
21	O	XERC Output for resetting error counter of X axis	55	O	YERC Output for resetting error counter of Y axis
22	I	EXTG Common for external power (+24V and +5V)	56	I	EXTG Common for external power (+24V and +5V)
23	O	XCW+ CW+ or PULSE+ of X axis	57	O	YCW+ CW+ or PULSE+ of Y axis
24	O	XCW- CW- or PULSE- of X axis	58	O	YCW- CW- or PULSE- of Y axis
25	O	XCCW+ CCW+ or DIR+ of X axis	59	O	YCCW+ CCW+ or DIR+ of Y axis
26	O	XCCW- CCW- or DIR- of X axis	60	O	YCCW- CCW- or DIR- of Y axis
27	I	EXTG Common for external power (+24V and +5V)	61	I	EXTG Common for external power (+24V and +5V)
28	I	XEA+ Encoder phase A+ feedback of X axis	62	I	YEA+ Encoder phase A+ feedback of Y axis
29	I	XEA- Encoder phase A- feedback of X axis	63	I	YEA- Encoder phase A- feedback of Y axis
30	I	XEB+ Encoder phase B+ feedback of X axis	64	I	YEB+ Encoder phase B+ feedback of Y axis
31	I	XEB- Encoder phase B- feedback of X axis	65	I	YEB- Encoder phase B- feedback of Y axis
32	I	XEZ+ Encoder phase Z+ feedback of X axis	66	I	YEZ+ Encoder phase Z+ feedback of Y axis
33	I	XEZ- Encoder phase Z- feedback of X axis	67	I	YEZ- Encoder phase Z- feedback of Y axis
34	I	EXTG Common for external power (+24V and +5V)	68	I	EXTG Common for external power (+24V and +5V)

5.2 JM1 Assignment / Definitions

PIN	Description	JM1		PIN	Description	
6	GND		1	DA	1	PWM DA (0~10V)
7	GND		2	GND	2	GND
8	GND		3	GND	3	GND
9	DA1 (-10V ~ +10V)		4	GND	4	GND
			5	DA0	5	DA0 (-10V ~ +10V)

5.3 JM2, JM3 Assignment / Definitions

PIN	Description	
1	CSTA: common start I/O	
2	CSTP: common stop I/O	
3	GND	

Note: Connect CSTA low to start motion from external.

Connect CSTP low to emergency stop motion from external.

5.4 JM4 Assignment / Definitions

PIN	Description	JM4		PIN	Description	
1	+5Vout_PC +5V from PC		14	+5Vout_PC +5V from PC	14	+5Vout_PC +5V from PC
2	PA1 Pulse handler1 A phase input		15	PB1	15	PB1 Pulse handler1 B phase input
3	PA2 Pulse handler2 A phase input		16	PB2	16	PB2 Pulse handler2 B phase input
4	GND		17	GND	17	GND
5	NC		18	NC	18	NC
6	NC		19	NC	19	NC
7	GND		20	GND	20	GND
8	+5Vout_PC +5V from PC		21	+5Vout_PC	21	+5Vout_PC +5V from PC
9	I0 TTL I/P bit0		22	I1	22	I1 TTL I/P bit1
10	I2 TTL I/P bit2		23	I3	23	I3 TTL I/P bit3
11	I4 TTL I/P bit4		24	I5	24	I5 TTL I/P bit5
12	I6 TTL I/P bit6		25	I7	25	I7 TTL I/P bit7
13	GND					

5.5 ADP9201_JM1 Assignment / Definitions

PIN	DESCRIPTIONS		PIN	DESCRIPTIONS
1	IN0: input0		2	OUT0:output0
3	IN1: input1		4	OUT1:output1
5	IN2: input2		6	OUT2:output2
7	IN3: input3		8	OUT3:output3
9	IN4: input4		10	OUT4:output4
11	IN5: input5		12	OUT5:output5
13	IN6: input6		14	OUT6:output6
15	IN7: input7		16	OUT7:output7
17	DGND: digital ground (EXTG)		18	DGND: digital ground (EXTG)
19	+24Ve: external input power supply		20	+24Ve: external input power supply

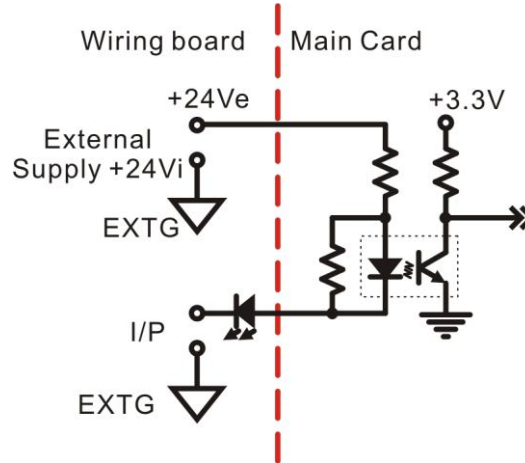
IN0	1	2	OUT0
IN1	3	4	OUT1
IN2	5	6	OUT2
IN3	7	8	OUT3
IN4	9	10	OUT4
IN5	11	12	OUT5
IN6	13	14	OUT6
IN7	15	16	OUT7
0V	17	18	0V
EXT +24Vin	19	20	EXT +24Vin

6. I/O interface diagram

6.1 JF1 ADP2042DIN

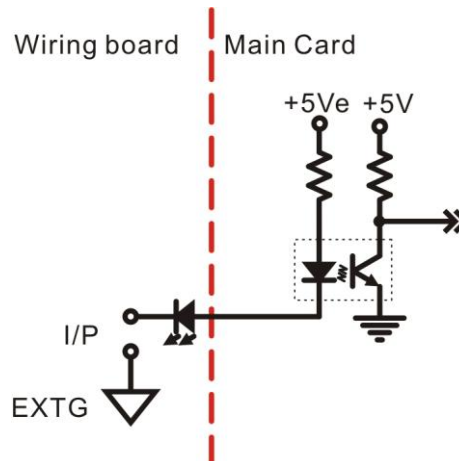
6.1.1 Input diagram

Type 1 input:



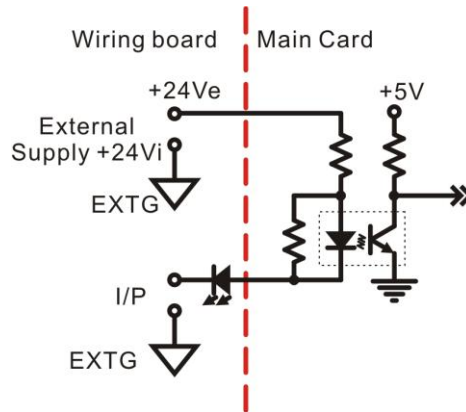
For input: LS+(EL+), LS-(EL-), HOME(ORG)

Type 2 input:



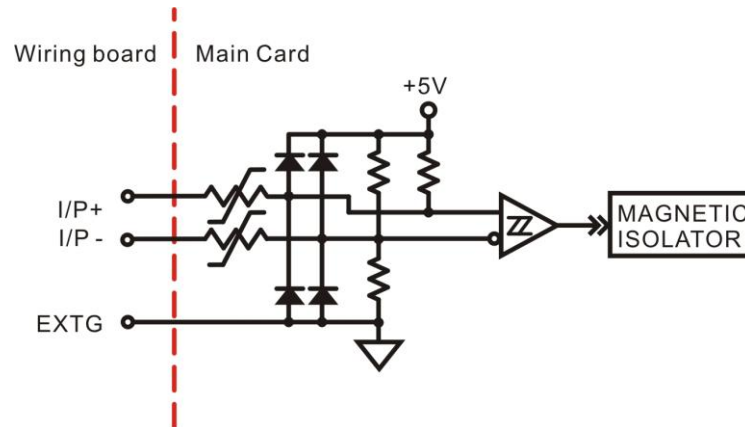
For input: INP,SRDY,ALM

Type 3 input:



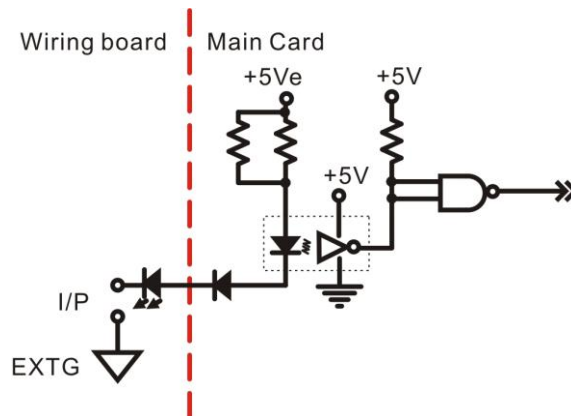
For input: ESD,PCS,STA,EMG

Type 4 input:



For encoder feedback input : A+/-,B+/-,Z/-

Type 4 input:

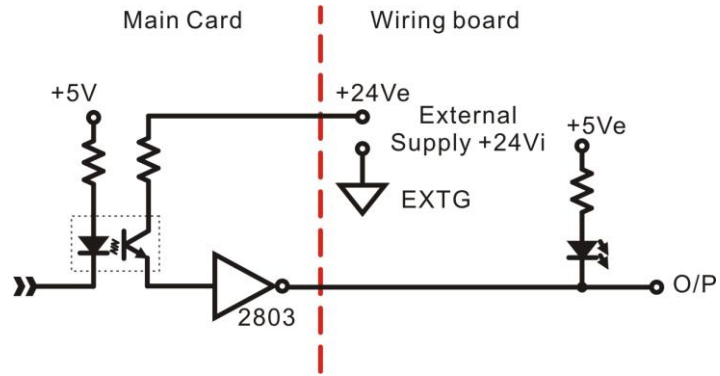


For input: LTC

Note: If you do not use the standard wiring board, please use a LED to the input circuit as shown above to prevent excess current of photo-coupler.

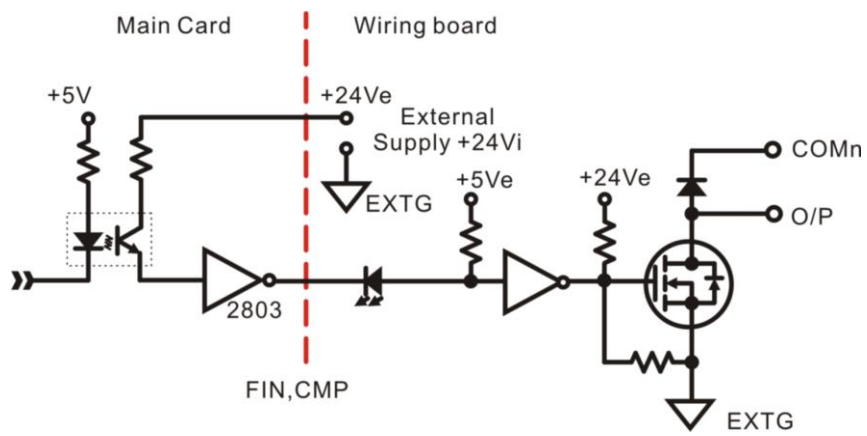
6.1.2 Output Diagram

Type 1 output:



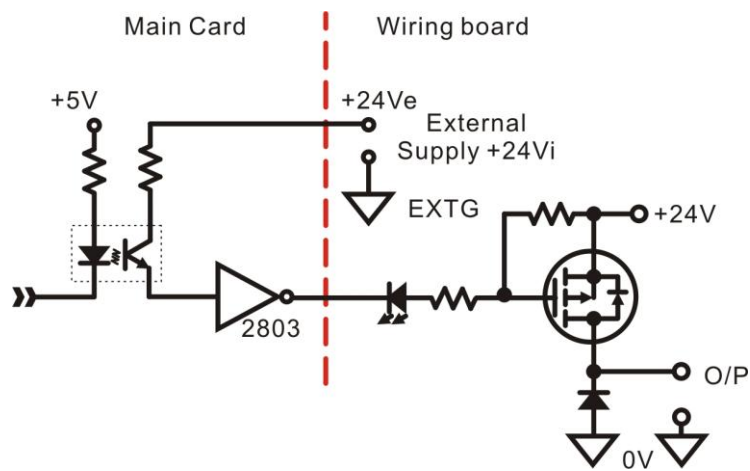
For SVON, ERC

Type 2 output:



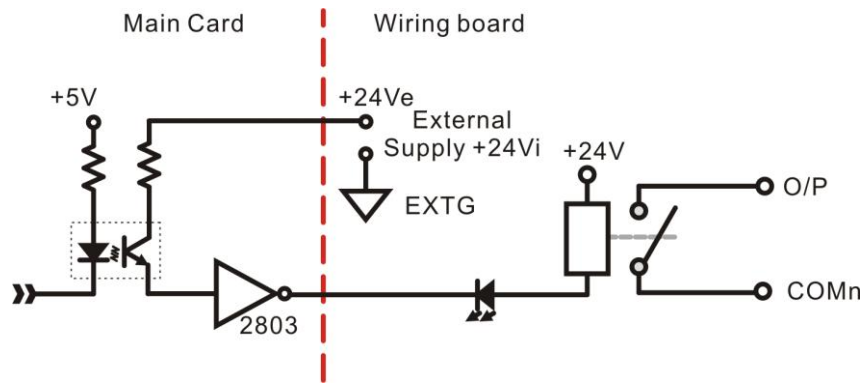
FIN,CMP(NMOS)

Type 3 output:



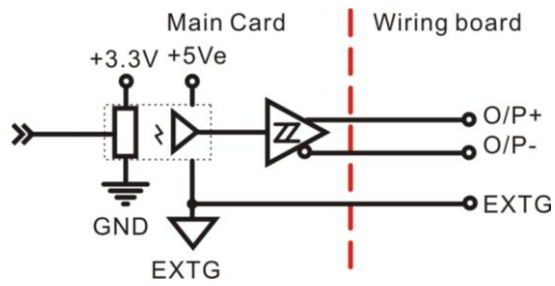
FIN,CMP(PMOS)

Type 4 output:



FIN,CMP(RELAY)

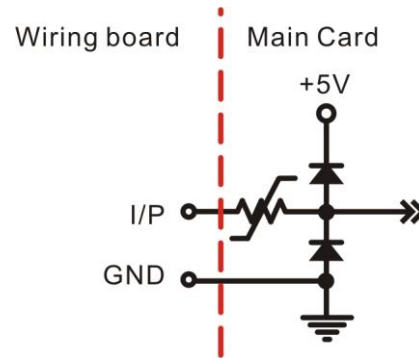
Type 5 output:



For motion control pulse output : CW,CCW

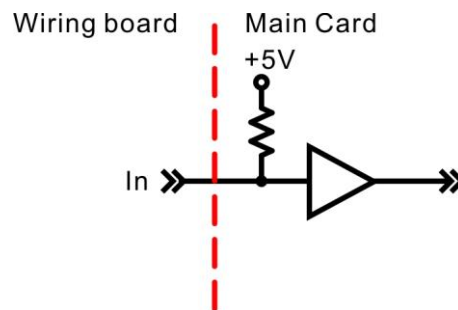
6.2 JM4 JS51050

Type 1 Input:



For Pulse Handler Input : PA,PB

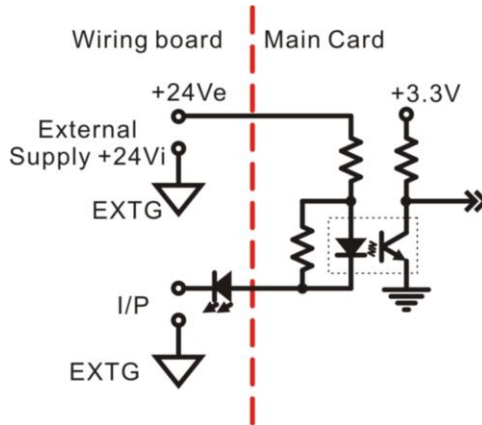
Type 2 TTL input:



For I0 ~ I7

6.3 ADP9201_JM1 ADP9201DIN

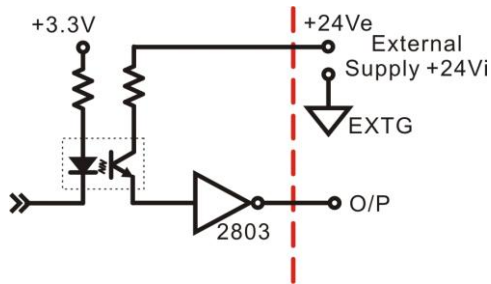
6.3.1 Input:



For input: IN0 ~ IN7

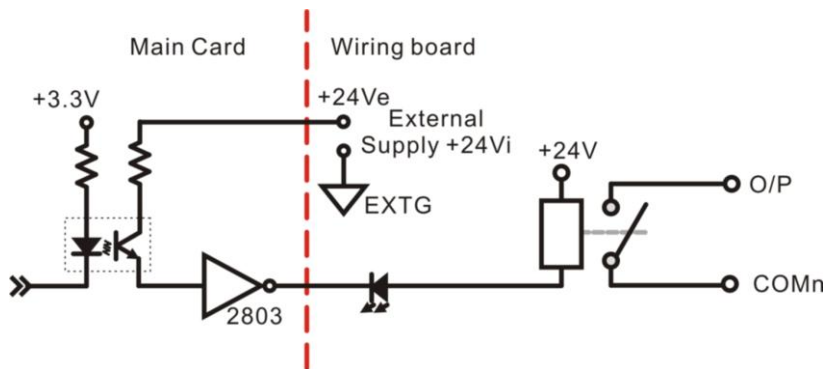
6.3.2 Output:

Type 1 output:



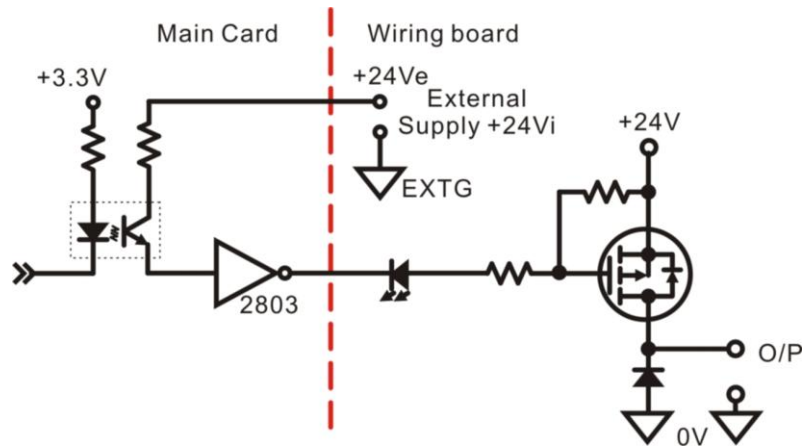
For OUT0 ~ OUT7(Transistor)

Type 2 output:



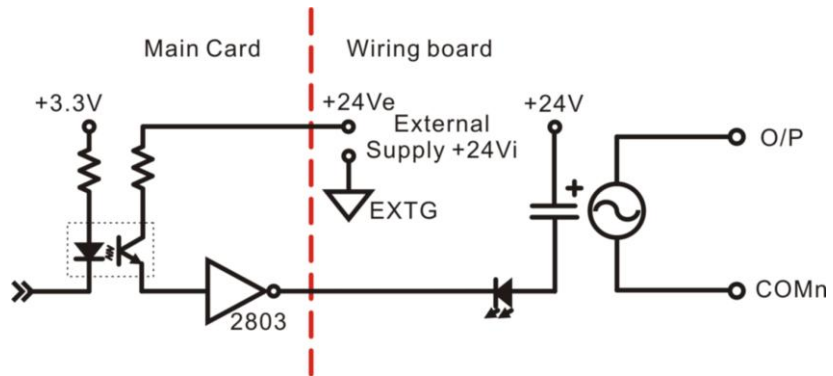
For OUT0 ~ OUT7(Relay)

Type 3 output:



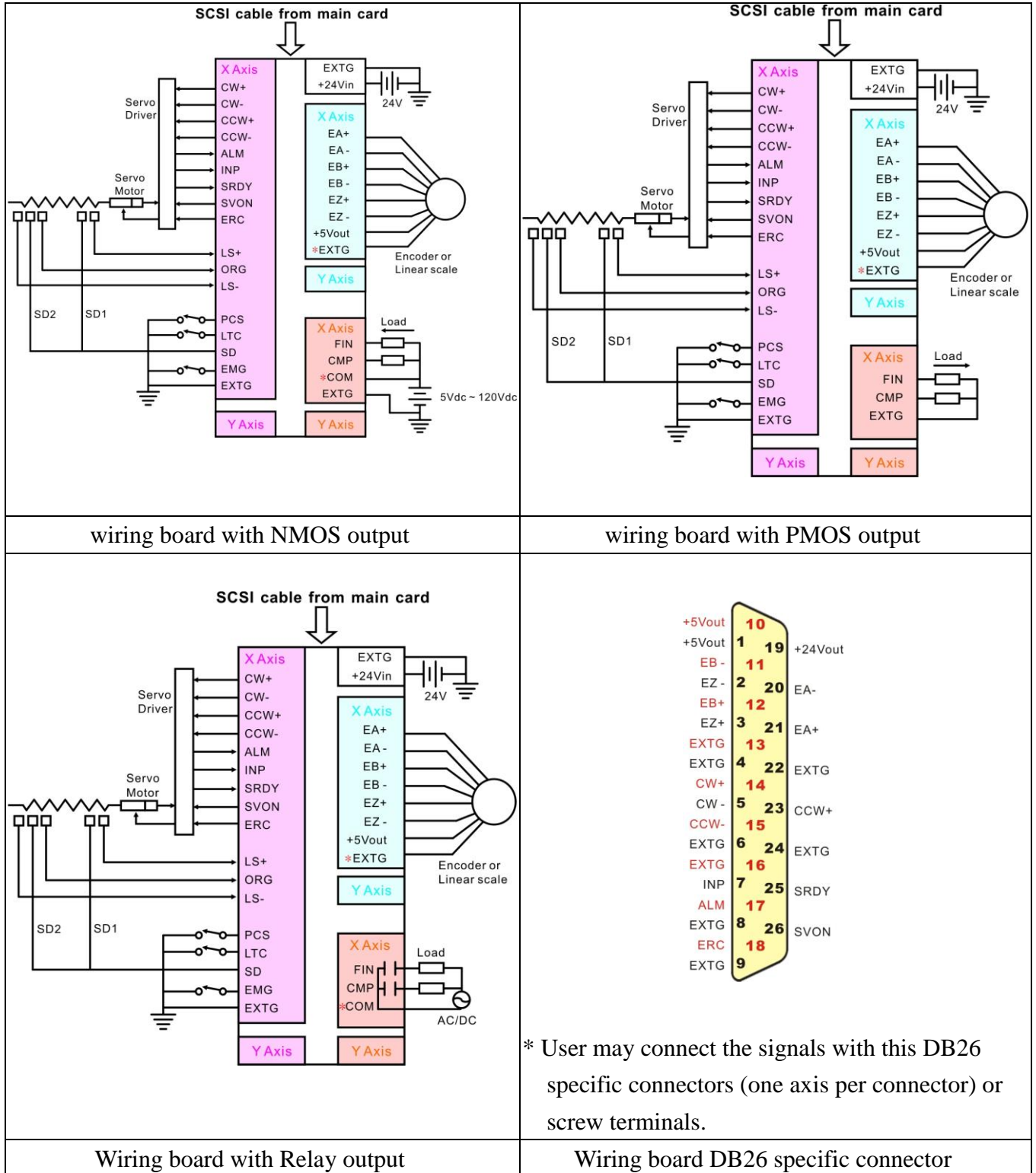
For OUT0 ~ OUT7(PMOS)

Type 4 output:



For OUT0 ~ OUT7(SSR)

7. External wiring diagram



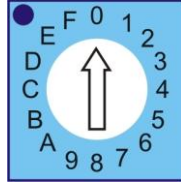
*Differential signals needs connect EXTG as common.

*COM connect to power supply as free-wheel path to avoid high voltage induced by inductive load.

8. Hardware settings

8.1 Card ID setting

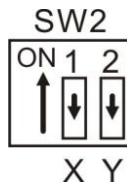
Since PCI cards have plug and play function, the card ID is required for programmer to identify which card he/she will control without knowing the physical address assigned by the Windows. A 4 bits ROTARY switch (select from 0 to 0xF) for extinguishing the 16 identical card.



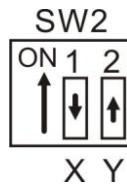
8.2 Polarity setting for over-travel limit switch

For different applications maybe you have different considerations, the polarity of over-travel limit switch can be set by on card Dip switch to meet your requirement.

Default : X, Y axis are in negative polarity , the DIP switch set as follows.



Example : X axis are in negative polarity and Y axis polarity are positive, the DIP switch set as follows.

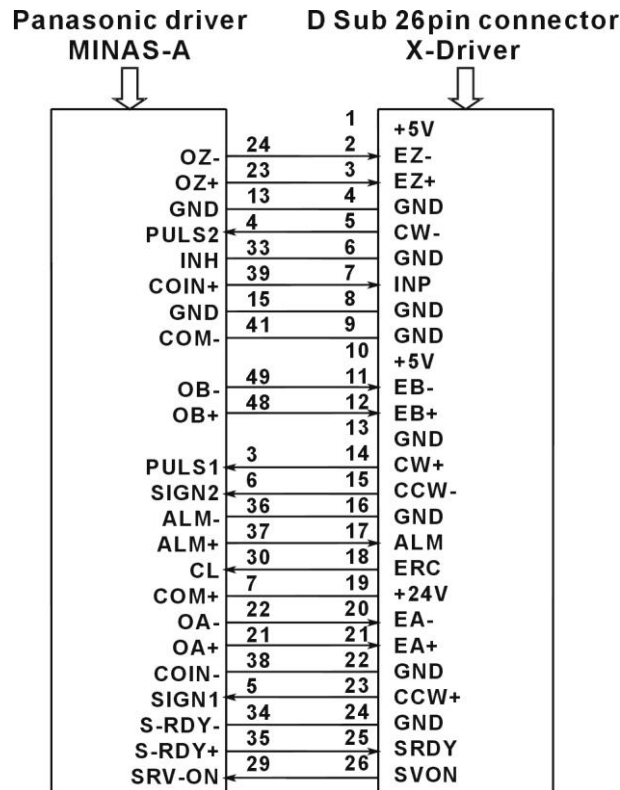


9. Applications

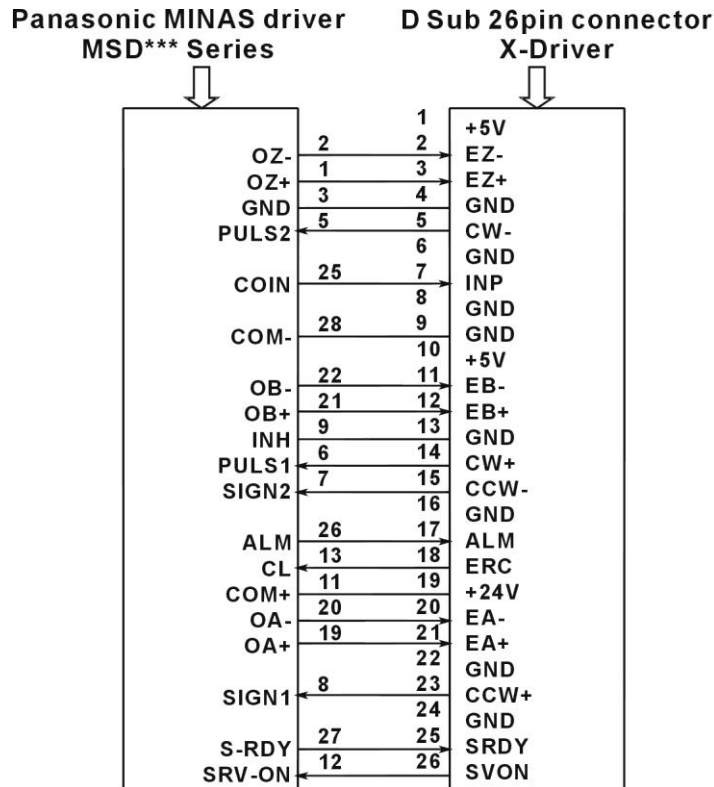
- Precision positioning control
- Precision speed control
- Contouring control
- X-Y table control
- Rotary machine control
- Robotic control
- Biotech sampling and handling
- Any combined control of servo and stepping motors

10. Wiring diagram examples

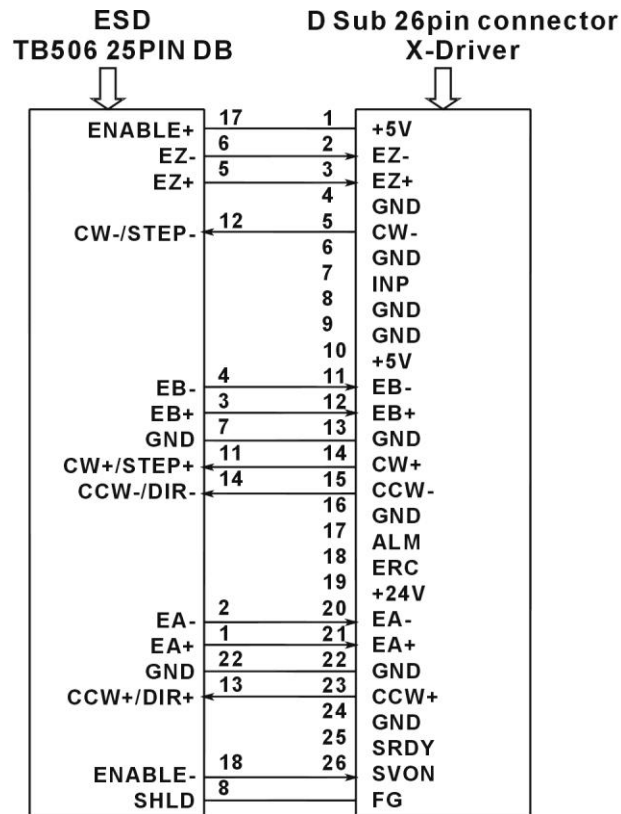
10.1 The wiring diagram for MPC3042A/3042AL wiring board to panasonic MINAS-A driver



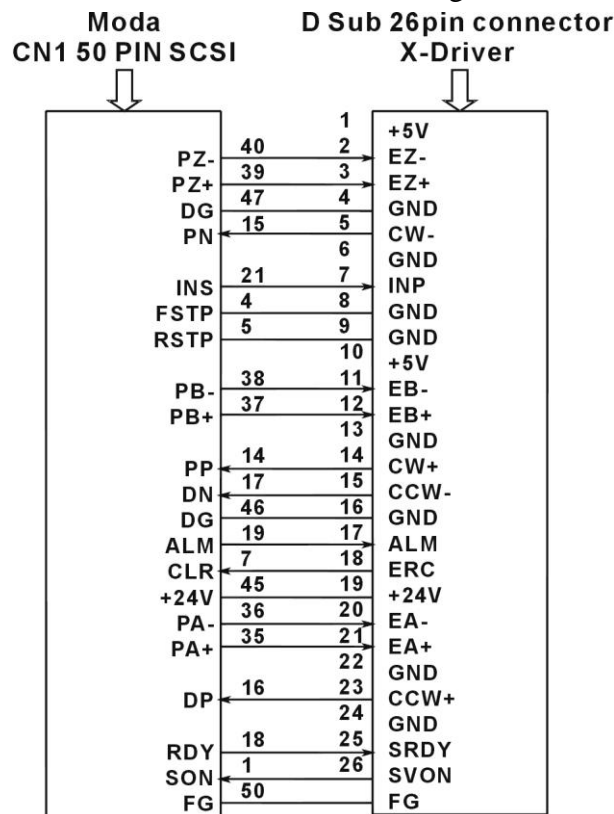
10.2 The wiring diagram for MPC3042A/3042AL wiring board to panasonic MINAS MSD*** driver



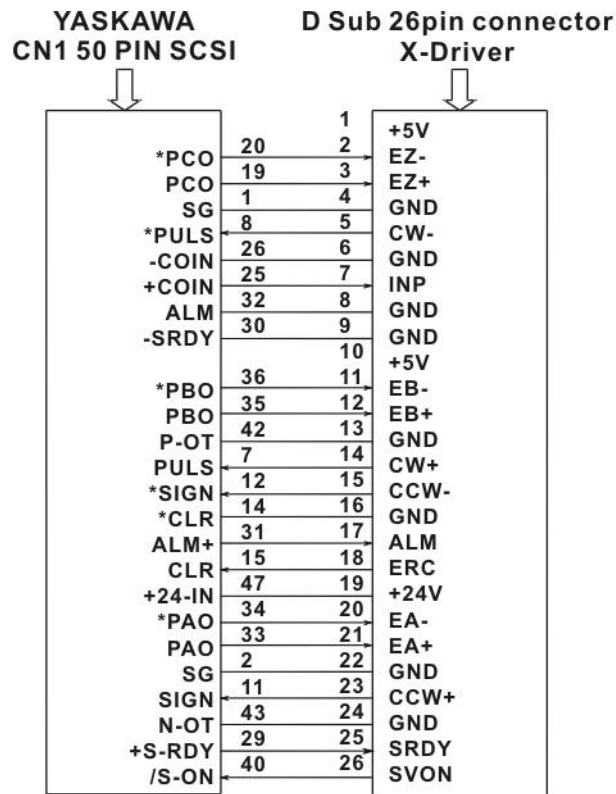
10.3 The wiring diagram for MPC3042A/3042AL wiring board to ESD servo driver



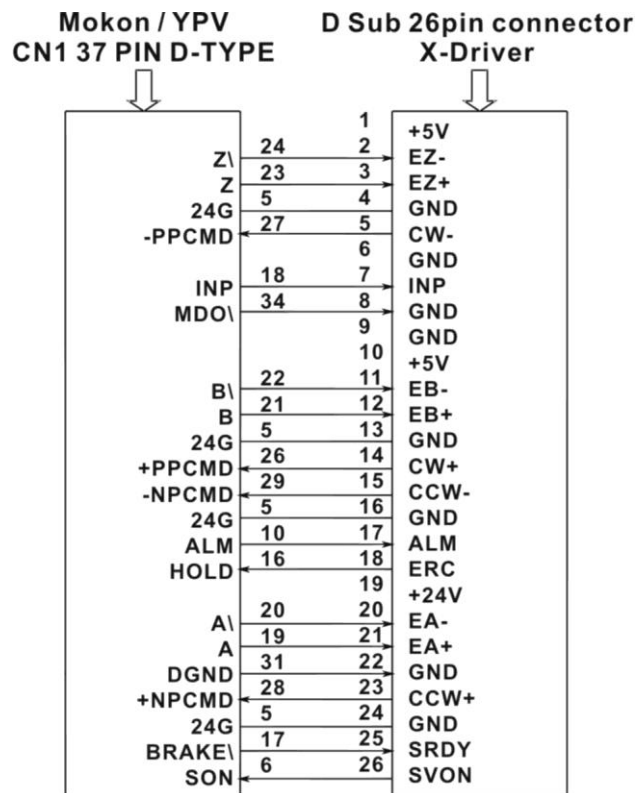
10.4 The wiring diagram for MPC3042A/3042AL wiring board to Moda servo driver



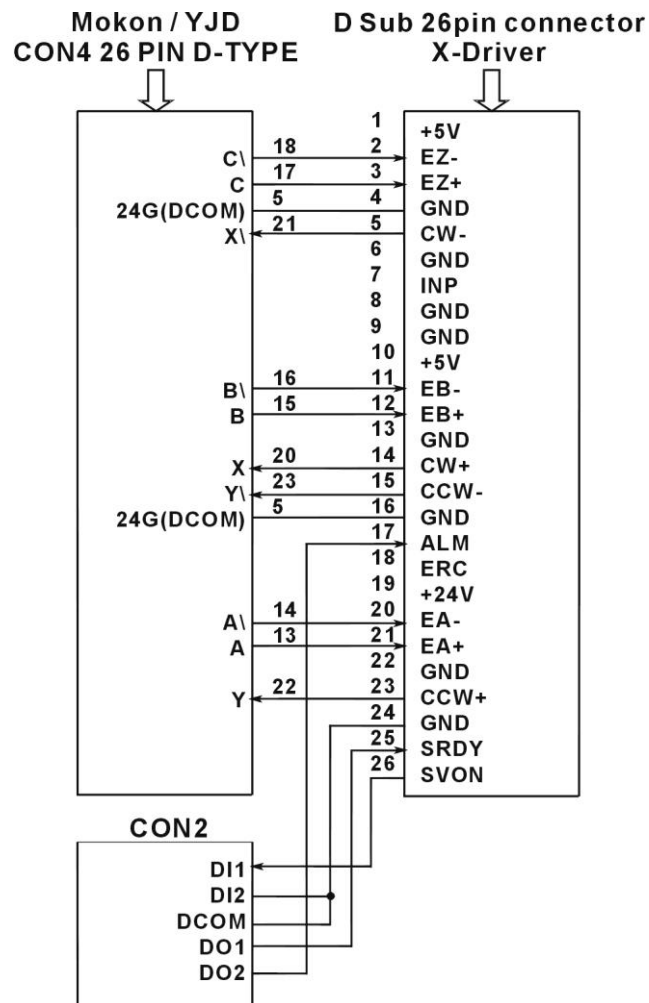
10.5 The wiring diagram for MPC3042A/3042AL wiring board to YASKAWA servo driver



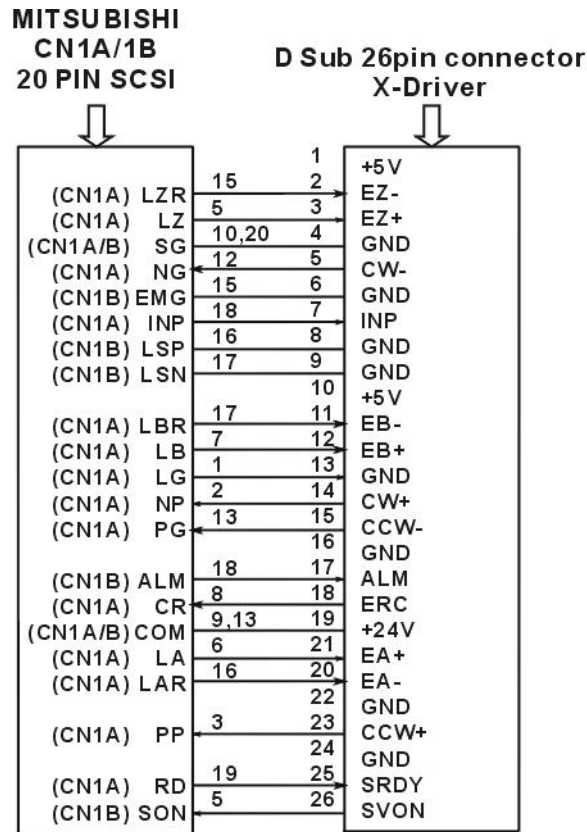
10.6 The wiring diagram for MPC3042A/3042AL wiring board to Mokon / YPV servo driver



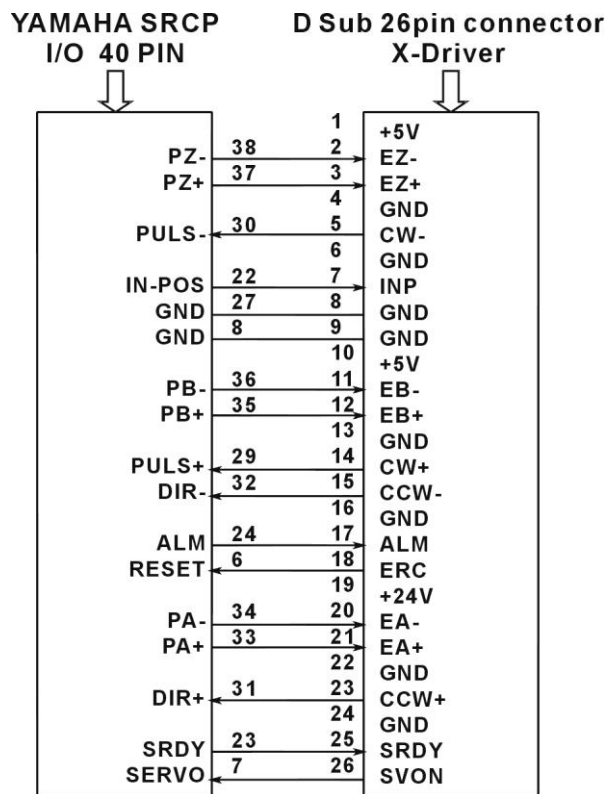
10.7 The wiring diagram for MPC3042A/3042AL wiring board to Mokon / YJD servo driver



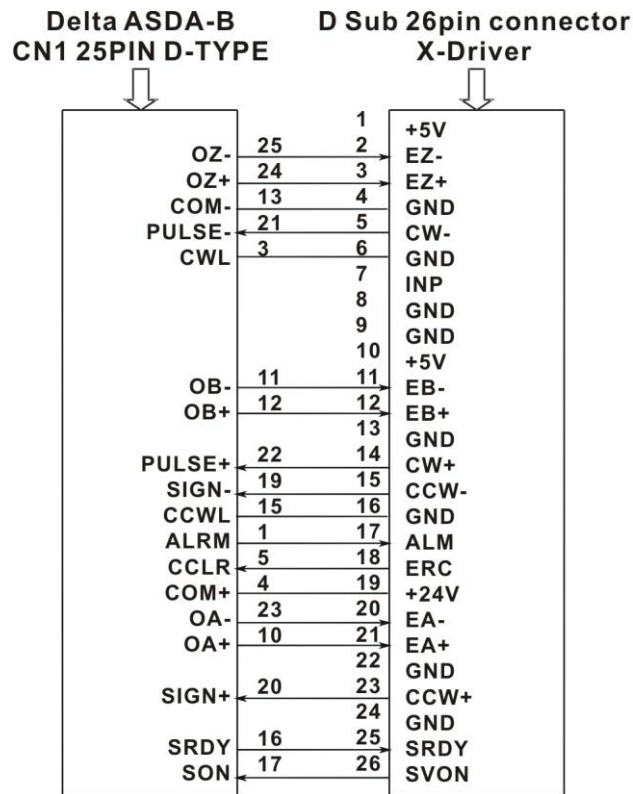
10.8 The wiring diagram for MPC3042A/3042AL wiring board to MITSUBISHI J2-SUPER servo driver



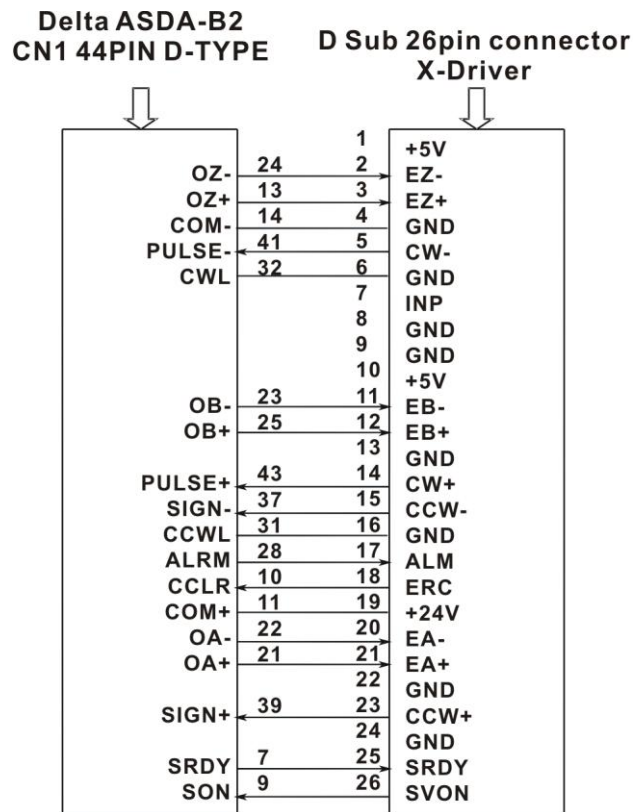
10.9 The wiring diagram for MPC3042A/3042AL wiring board to YAMAHA SRCP servo driver



10.10 The wiring diagram for MPC3042A/3042AL wiring board to Delta ASDA-B servo driver



10.11 The wiring diagram for MPC3042A/3042AL wiring board to Delta ASDA-B2 servo driver



11. Ordering information

PRODUCT	DESCRIPTIONS
MPC3042A	2-axis motion control card for servo/step motor control with pulse referenced PI control (include SM2341104)
MPC3042AL	2-axis motion control card for servo/step motor control (include SM2341104)
ADP2042DIN(N)	DIN rail mounted wiring board matched MPC2042/3042/3042L/3042A/3042AL,General output : 4 power NMOS
ADP2042DIN(P)	DIN rail mounted wiring board matched MPC2042/3042/3042L/3042A/3042AL,General output : 4 power PMOS
ADP2042DIN(R)	DIN rail mounted wiring board matched MPC2042/3042/3042L/3042A/3042AL,General output : 4 relays
ADP9201DIN(R)	DIN rail mounted wiring board with 16 I/O LED indicators and relay output for 8DI and 8DO for ADP9201_JM1
ADP9201DIN(P)	DIN rail mounted wiring board with 16 I/O LED indicators and PMOS output for 8DI and 8DO for ADP9201_JM1
ADP9201DIN(S)	DIN rail mounted wiring board with 16 I/O LED indicators and SSR output for 8DI and 8DO for ADP9201_JM1
JS51050	DIN rail mounted dummy wiring board (D type 25p male to terminals) for JM4
FVC01	Frequency to voltage module
M2668681541	68-pin SCSI cable 1.5M
M2668683021	68-pin SCSI cable 3.0M
M270325X4	D type 25p male-female cable 1.5M
M270325X4S	D type 25p male-female cable 1.5M,shielding
M270325X0	D type 25p male-female cable 3.0M
M270325X0S	D type 25p male-female cable 3.0M,shielding
M23207	20 pin flat cable 1.5M
M23209	20 pin flat cable 3.0M
SM2341104	Extension kit for JM1and JM4 (bracket and flat cable for 9p male D-type and 25p female D-type connector)