

MPC-3004

4 Axes Positioning card

User's Manual (V1.4)

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1. FORWARD

MPC3004 is a PCI bus point to point 4 axes motion control card, which is DSP based design with the FPGA technology developed by JS Automation Corp.

Owing to the high performance of DSP we call this card “Intelligent card”, MPC3004 consumes less CPU resource and gives a better performance than other dummy cards.

The practical application consideration makes this card easy to use and easy to wire, the security function also provides the system integrator a protection of illegal copy of firmware.

other motion control card:

MPC-2004 4 axes point to point motion control card (ISA bus)

Any comment is welcome,

please visit our website: www.automation.com.tw for the up to date informations.

2. PACKING LIST

2.1	MPC-3004 4 AXES POSITIONING CARD	1
2.2	DEMO CD	1
2.3	SCSI 50P CABLE 150CM.(OPTION 300CM)	1
2.4	DIN RAIL MOUNTED WIRING BOARD	1
2.5	ACCESSORY	1

3. FEATURES

- 3.1 PCI plug and play function with card ID for 16 identical cards
- 3.2 On board DSP processor performs multi-task controls with PC's CPU
- 3.3 On board FPGA deal with real time servo control
- 3.4 Design with high pulse rate and good accuracy of acceleration
- 3.5 Software key (password) protects user's know-how
- 3.6 Software limit switch blocks safe area (space)
- 3.7 Photo-coupler isolated general I/O and limit switch circuit
- 3.8 Backlash compensation to compensate tolerance on moving parts
- 3.9 Separate parameters setting for Homing and positioning function
- 3.10 Multiple programmable Homing modes
- 3.11 Programmable polarity and enable/disable function to fit different kinds of limit switch
- 3.12 Absolute and relative positioning mode
- 3.13 Two stop modes included halt and deceleration to stop
- 3.14 Software programmable parameter setting for load_current_position
- 3.15 Scale ratio formula for real distance programming (pulse count implied)
- 3.16 Hardware selectable single or dual pulse mode

4. SPECIFICATIONS

4.1 MPC-3004 MAIN CARD

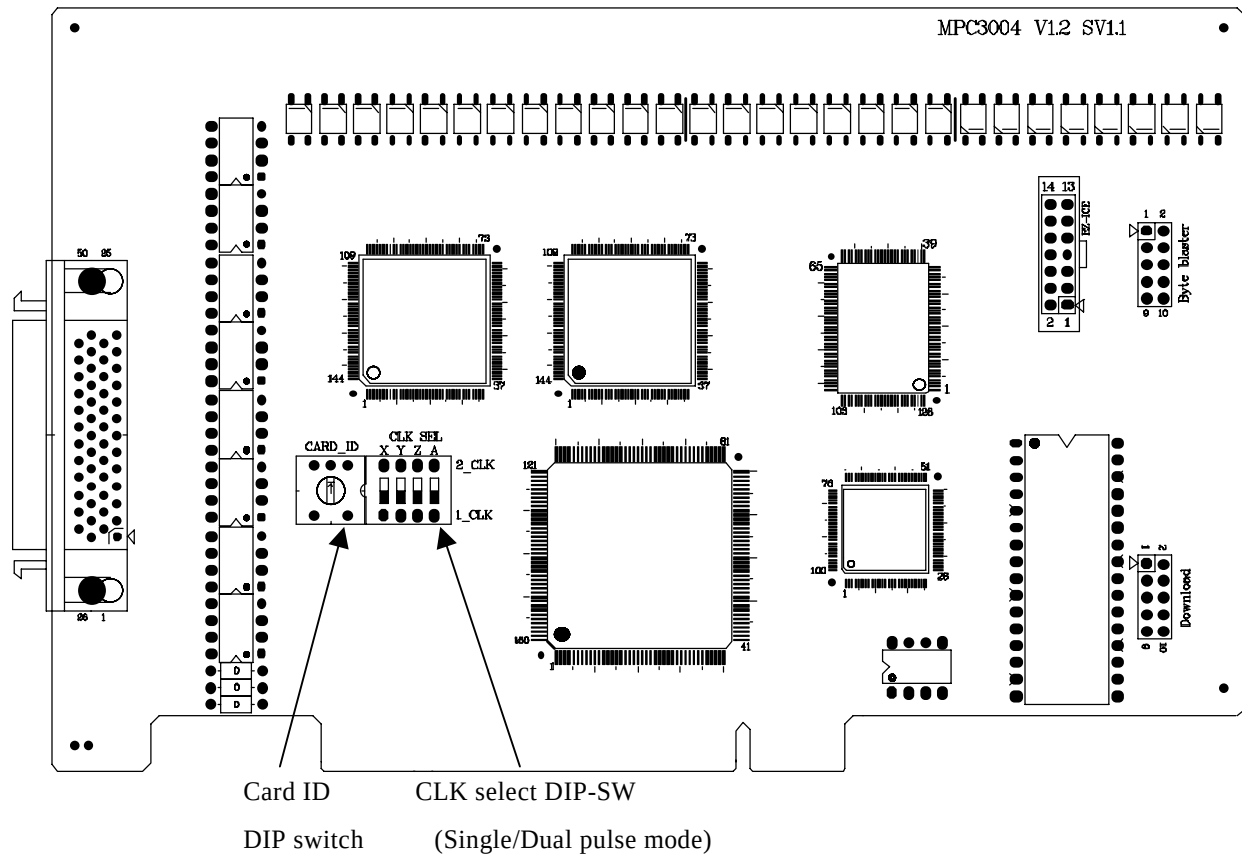
- 4.1.1 Input photo-coupler isolation voltage — 2500Vac 1Min
- 4.1.2 Data width — 32 Bits
- 4.1.3 Control axes — 4
- 4.1.4 Card ID — 4 bits
- 4.1.5 Specific input — 3 (LS+, LS-, Home) per axis with photo-coupler
- 4.1.6 General input — 8 with photo-coupler
- 4.1.7 General output — 8 with photo-coupler and relay contact “a”
- 4.1.8 Maximum length setting — 24 Bits (e.g. 16, 777, 215 unit length)
- 4.1.9 Arithmetic calculation — 32 Bits
- 4.1.10 Max. speed of driving pulse — 1Mhz
- 4.1.11 Max. acceleration rate — 4Mhz/sec
- 4.1.12 Frequency deviation — $\pm 0.005\%$ of driving pulse
- 4.1.13 Max. working distance — 32 Bits (e.g. $\pm 2,147,483,647$ unit length)
- 4.1.14 Timer setting range — 0-60,000ms circulating
- 4.1.15 I/O connector — mini SCSI female 50 pins between wiring boards
- 4.1.16 Connector type — plugable connector
- 4.1.17 External supply — DC 24V $\pm$ 4V
- 4.1.18 Operation temp — 0 to 70° C
- 4.1.19 Operation humidity — RH5~95%, non-condensing
- 4.1.20 Dimension — 178(W)*115(H)mm, 7.0(W)*4.53(H)in

4.2 MPC DIN RAIL MOUNTED WIRING BOARD

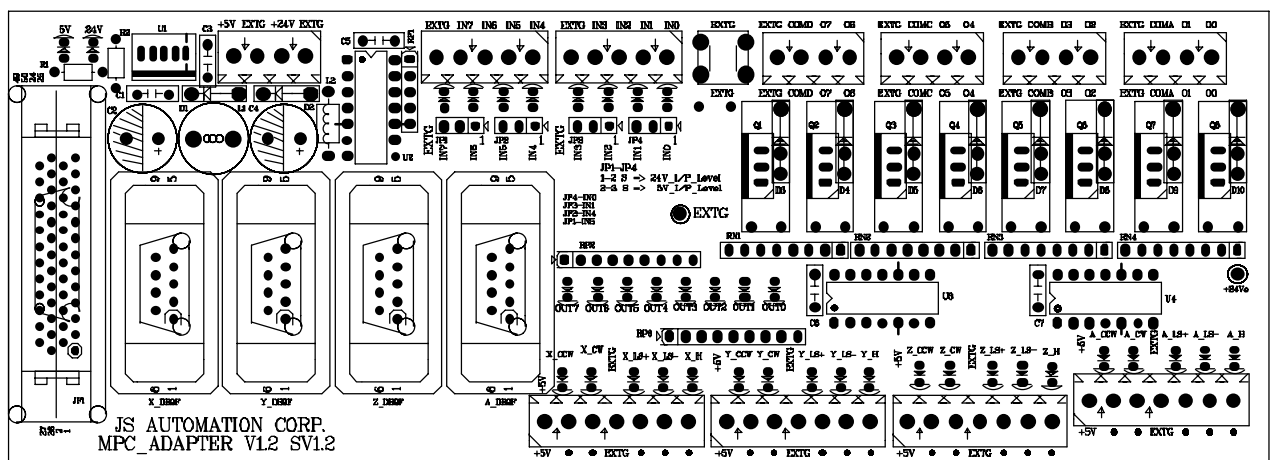
- 4.2.1 External supply — DC 24V $\pm$ 4V
- 4.2.2 On board build-in s.p.s. — DC+5V 500ma (max)
- 4.2.3 Operation temp — 0 to 70° C
- 4.2.4 General input LED — 8
- 4.2.5 General output — 8 power MOS (1A 120V DC) with LED
- 4.2.6 Specific I/O LED — 20
- 4.2.7 Specific servo control connector — 4 D-type 9 pin connector
- 4.2.8 Operation humidity — RH5~95%, non-condensing
- 4.2.9 Dimension — 200(W)*72(H)mm, 7.87(W)*2.83(H)in

5. LAYOUT

5.1 MPC-3004 MAIN CARD LAYOUT

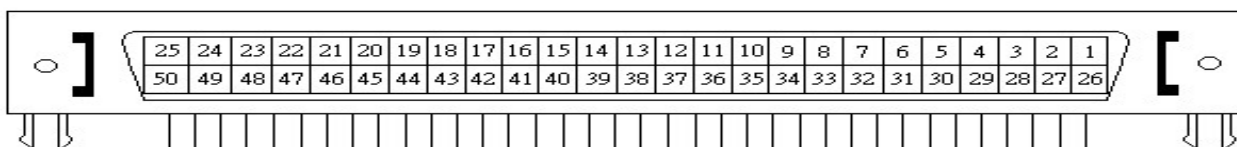


5.2 DIN RAIL MOUNTED WIRING BOARD LAYOUT



6. PIN DEFINITIONS

6.1 CONNECTOR FRONT VIEW

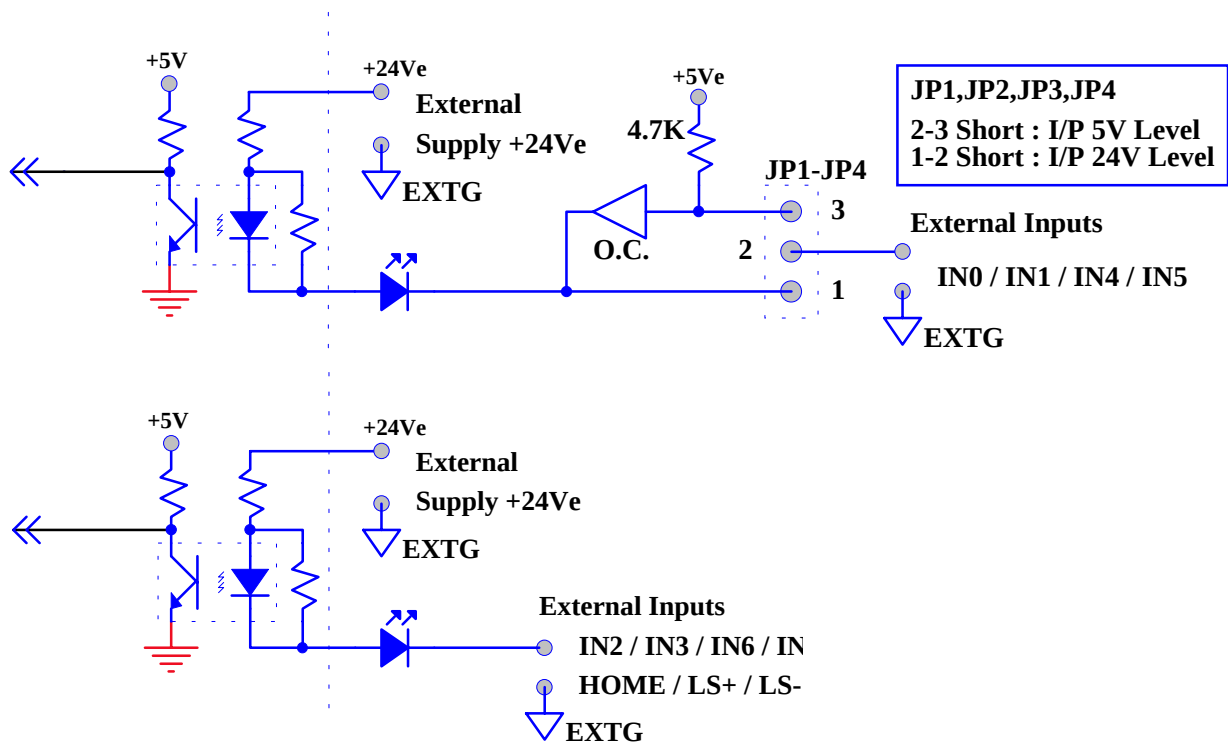


6.2 PIN DEFINITIONS

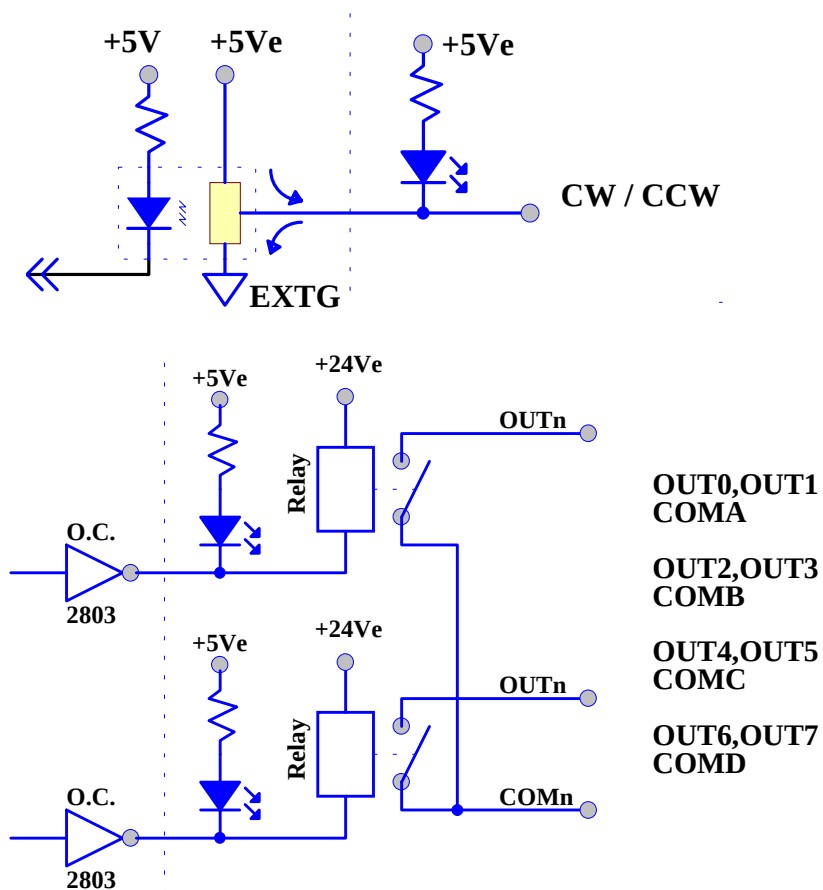
Pin No.	Descriptions	Pin No.	Descriptions
1	+24V (External supplied DC/24V power input)	26	GND (common terminal for +24V , +5V, I/P , O/P)
2	+24V (External supplied DC/24V power input)	27	GND (common terminal for +24V , +5V, I/P , O/P)
3	+5V (DC/5V output,regulated from external 24V input)	28	GND (common terminal for +24V , +5V, I/P , O/P)
4	+5V (DC/5V output,regulated from external 24V input)	29	GND (common terminal for +24V , +5V, I/P , O/P)
5	X_CW (CLOCK) : CW for dual pulse mode , CLOCK for single pulse mode	30	Z_CW (CLOCK) : CW for dual pulse mode , CLOCK for single pulse mode
6	Y_CW (CLOCK) : CW for dual pulse mode , CLOCK for single pulse mode	31	A_CW (CLOCK) : CW for dual pulse mode , CLOCK for single pulse mode
7	X_CCW (DIR) : CCW for dual pulse mode , DIRECTION for single pulse mode	32	Z_CCW (DIR) : CCW for dual pulse mode , DIRECTION for single pulse mode
8	Y_CCW (DIR) : CCW for dual pulse mode , DIRECTION for single pulse mode	33	A_CCW (DIR) : CCW for dual pulse mode , DIRECTION for single pulse mode
9	X_LS+ : Positive over-travel limit switch input for X axis	34	Z_LS+ : Positive over-travel limit switch input for Z axis .
10	Y_LS+ : Positive over-travel limit switch input for Y axis	35	A_LS+ : Positive over-travel limit switch input for A axis .
11	X_LS-- : Negative over-travel limit switch input for X axis	36	Z_LS- : Negative over-travel limit switch input for Z axis .
12	Y_LS-- : Negative over-travel limit switch input for Y axis	37	A_LS- : Negative over-travel limit switch input for A axis .
13	X_HOME : Home limit switch input for X axis	38	Z_HOME : Home limit switch input for Z axis .
14	Y_HOME : Home limit switch input for Y axis	39	A_HOME : Home limit switch input for A axis .
15	GND (common terminal for +24V , +5V, I/P , O/P)	40	GND (common terminal for +24V , +5V, I/P , O/P)
16	GND (common terminal for +24V , +5V, I/P , O/P)	41	GND (common terminal for +24V , +5V, I/P , O/P)
17	GND (common terminal for +24V , +5V, I/P , O/P)	42	GND (common terminal for +24V , +5V, I/P , O/P)
18	IN0 : General purpose input0	43	OUT0 : General purpose output .
19	IN1 : General purpose input1	44	OUT1 : General purpose output .
20	IN2 : General purpose input2	45	OUT2 : General purpose output .
21	IN3 : General purpose input3	46	OUT3 : General purpose output .
22	IN4 : General purpose input4	47	OUT4 : General purpose output .
23	IN5 : General purpose input5	48	OUT5 : General purpose output .
24	IN6 : General purpose input6	49	OUT6 : General purpose output .
25	IN7 : General purpose input7	50	OUT7 : General purpose output .

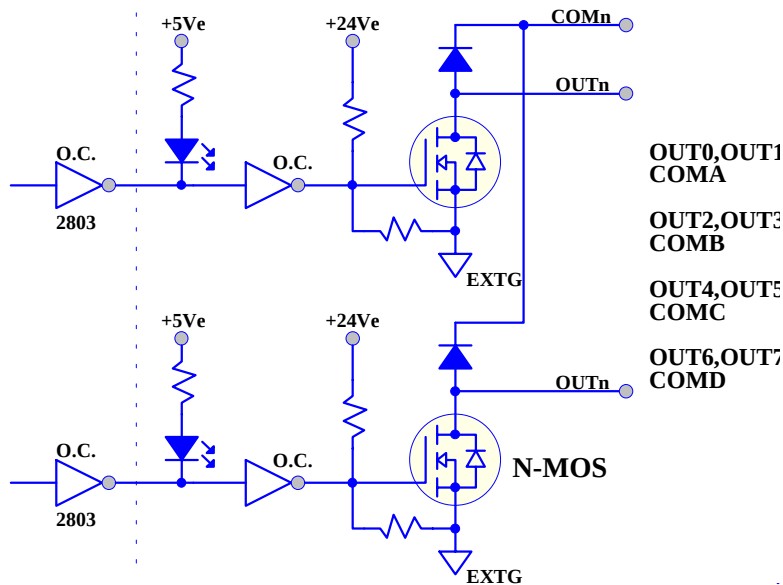
7. I/O INTERFACE DIAGRAM

7.1 WIRING BOARD INPUT DIAGRAM



7.2 WIRING BOARD OUTPUT DIAGRAM

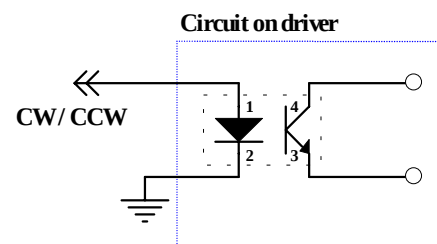
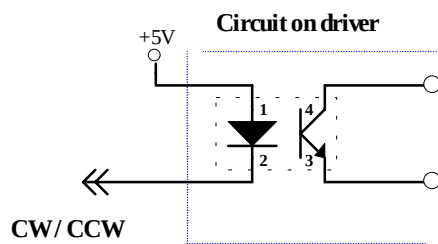




7.3 MPC-3004 PULSE DRIVING METHOD FOR SINGLE END INPUT:

<< Active Lo >>

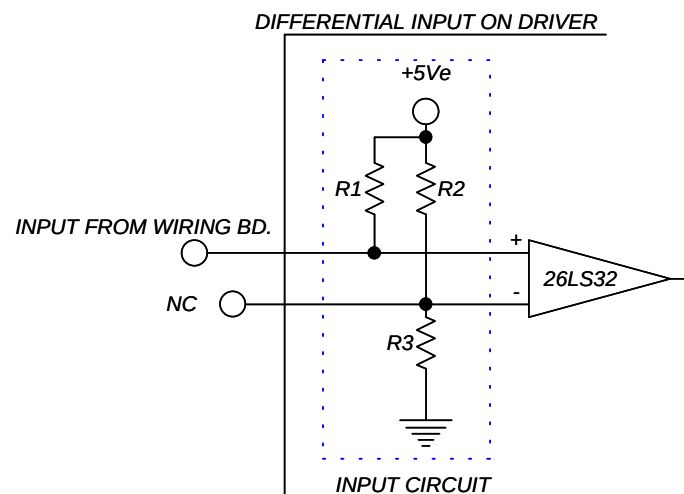
<< Active Hi >>



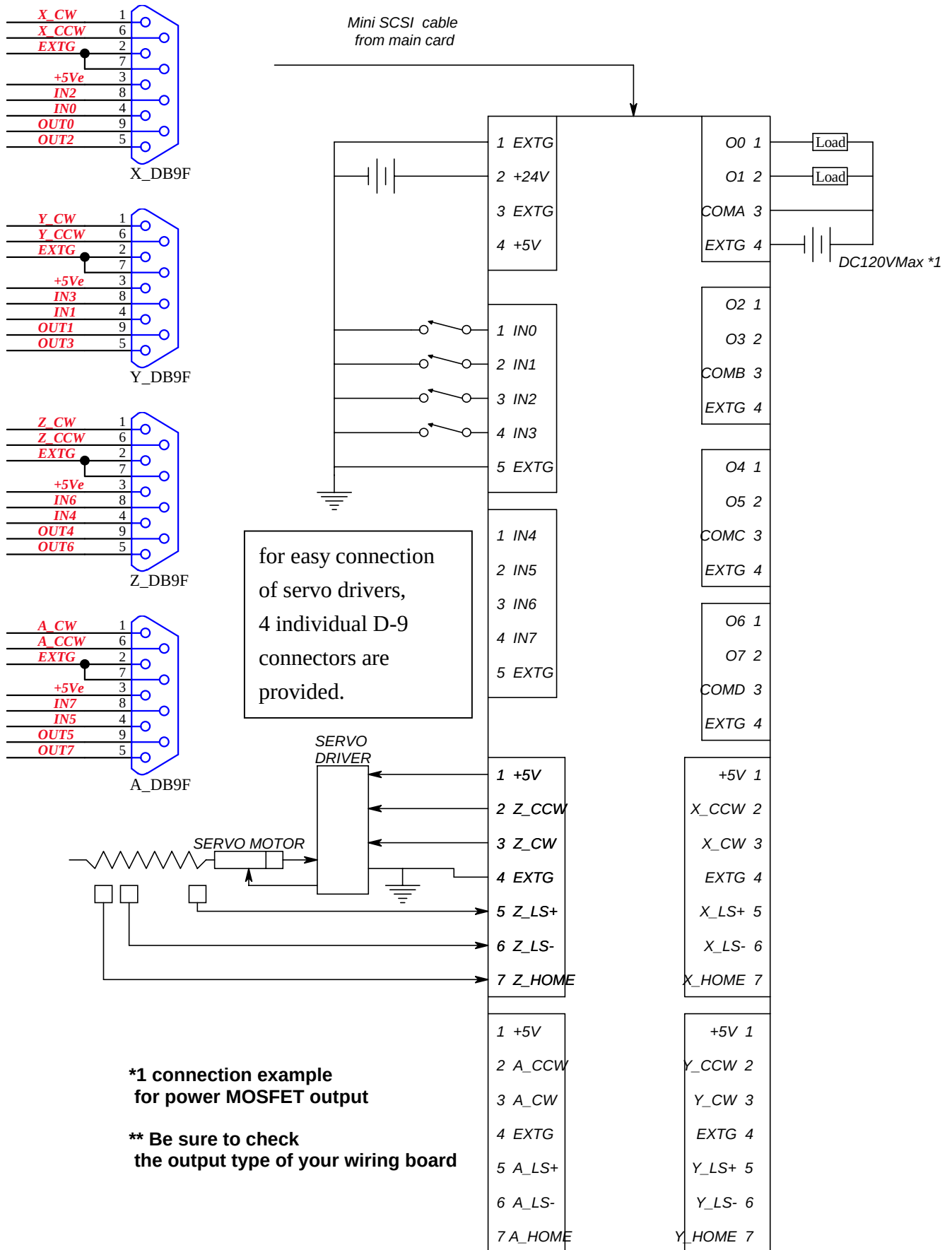
7.4 PULSE DRIVING METHOD FOR DIFFERENTIAL INPUT:

If your driver's differential input has pull up resistor as the right diagram, direct connection to cw+/ccw+ is acceptable otherwise external resistor connect as right diagram is required.

The recommended value for R1~R3 is 4.7K |Ohm.



8. EXTERNAL WIRING DIAGRAM

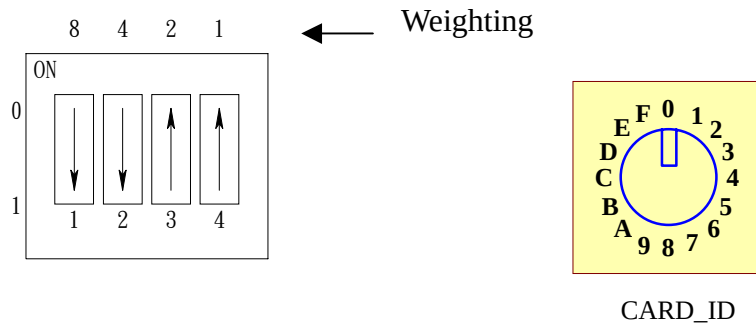


9. HARDWARE SETTINGS

9.1 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 DIP switch for distinguishing the 16 identical card. The following example sets the card ID at 12.

DIP SW SETTING : (ID=12)

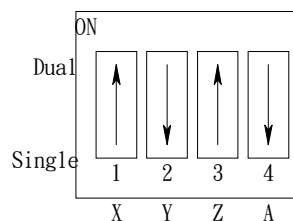


9.2 SINGLE/DUAL PULSE MODE SETTING

9.2.1 1_CLK(4DIP-SW) : Single/Dual pulse mode setting

Any bit set “on” means the corresponding axis in dual pulse mode ,otherwise single pulse mode.

The following example sets Y,A axes in Single pulse mode (CLOCK,DIRECTION)and both X&Z axes in Dual pulse mode (CW,CCW)



10. HOW TO USE DOS DEMO PROGRAM

10.1 BEFORE USING THE DEMO PROGRAM

The demo program is provided to the user with the purpose of familiar the functions of MPC card. You should setup the driver and dll in windows to register the resources. Since the demo program is implemented in DOS environment, the card address should be get from “settings->control panel->system->device manager->MPC3004”.

10.2 START UP :

Execute the demo program MPC3004.exe and then key in the card address. If press “enter” without any card address data , the default address is 200H.

There are four blocks in the screen: motion control, speed adjustment, global i/o, security

```
***** MPC-2004 PULSE DISTRIBUTING CARD ***** Ver 1.0

[ MOTION CONTROL ]
PORT NUMBER:.....7 6 5 4 3 2 1 0
[Q]SYSTEM LOGIC(INPL):0 0 0 1 1 1 1 1
[LOGIC_DIR.6][HOME.2][LSN.1][LSP.0]
[T]_MOVING MODE..... H_DIR+ ABS
                        H_DIR- REL+
                        H_RETN REL-
[F]_ENABLE ZERO..... Disable
[K]_TARGET POSITION ..... 800
   _CURRENT POSITION ..... 0
   _ACTIVE STATUS..... 0X0017

[ SPEED ADJUSTMENT ]
[X]_MOVING START PULSE RATE.. 200
[C]_MOVING MAX. PULSE RATE.. 2000
[V]_MOVING ACC. PULSE RATE.. 1000
[B]_HOMING START PULSE RATE.. 200
[N]_HOMING MAX. PULSE RATE.. 2000
[M]_HOMING ACC. PULSE RATE.. 1000
[S]_HOMING SLOW PULSE REAT.. 200
[A]_BACKLASH PULSE..... 0
[D]_LENTH/REV (mm/rev)..... 1
[R]_MOTOR'S RESOLUTION(pulse) 1

[ GLOBAL I/O ]
[F1]_RESET STATUS: VALUE: 5AA5
CLOCK.....10.272
   _PORT NUMBER.....7 6 5 4 3 2 1 0
[W]_INPUT LOGIC :....1 1 1 1 1 1 1 1
[E]_OUTPUT LOGIC :....1 1 1 1 1 1 1 1
   INPUT PORT :....1 1 1 1 1 1 1 1
[7-0]OUTPUT PORT :....0 0 0 0 0 0 0 0

[ SECURITY ]
SECURITY MESSAGE(SEC_CMD) .... Ready
SECURITY MODE ..... Enable
SECURITY STATUS ..... Open
[F2]CHANGE SECURITY CODE
[F4]FIRST SET SECURITY CODE
[F5]OPEN SECURITY CODE

[ COMMANDS ]
[P]_Position [L]_Load COPS [Z]_4 Axis
[I]_HaltStop [O]_DecStop

[Esc]-Quit

SEGMENT:200 AXIS:X [ USER MODE ]
```

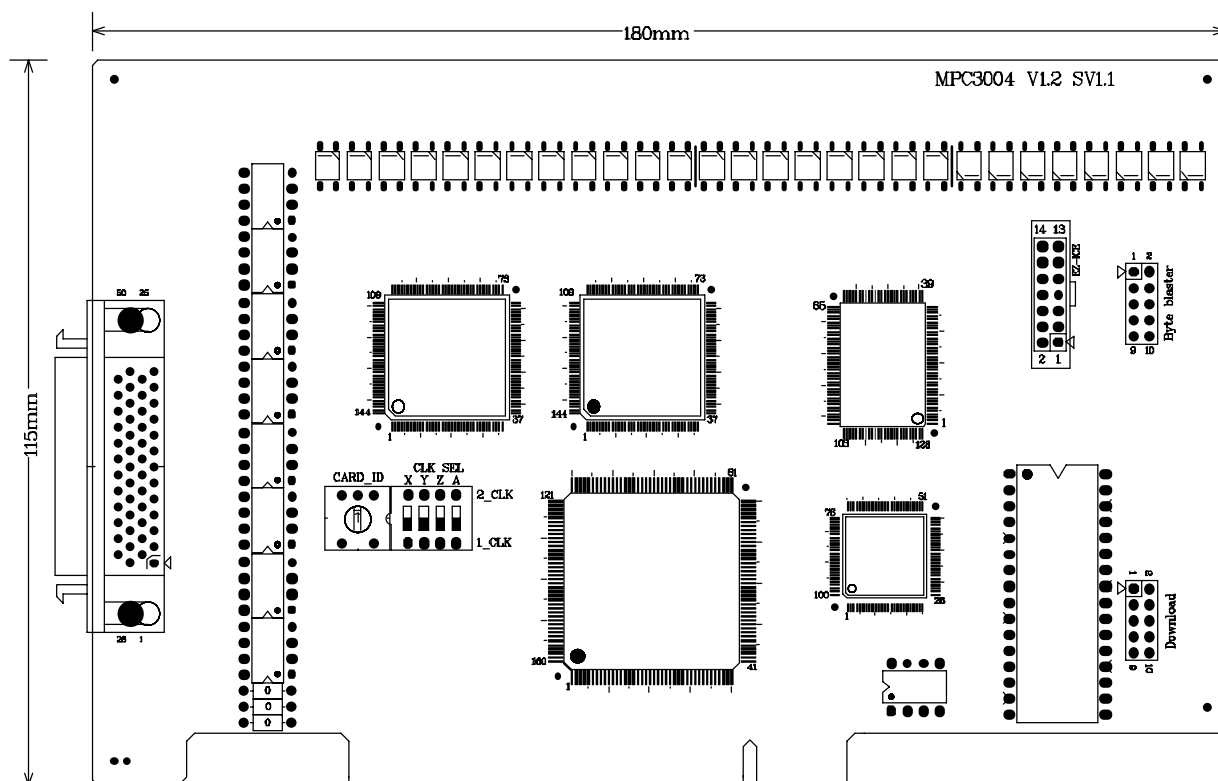
10.3 All the functions are “one stroke” command, you only press the key data as it is in the bracket [], you will get a prompt and follows its instruction everything is ok.

11. APPLICATIONS

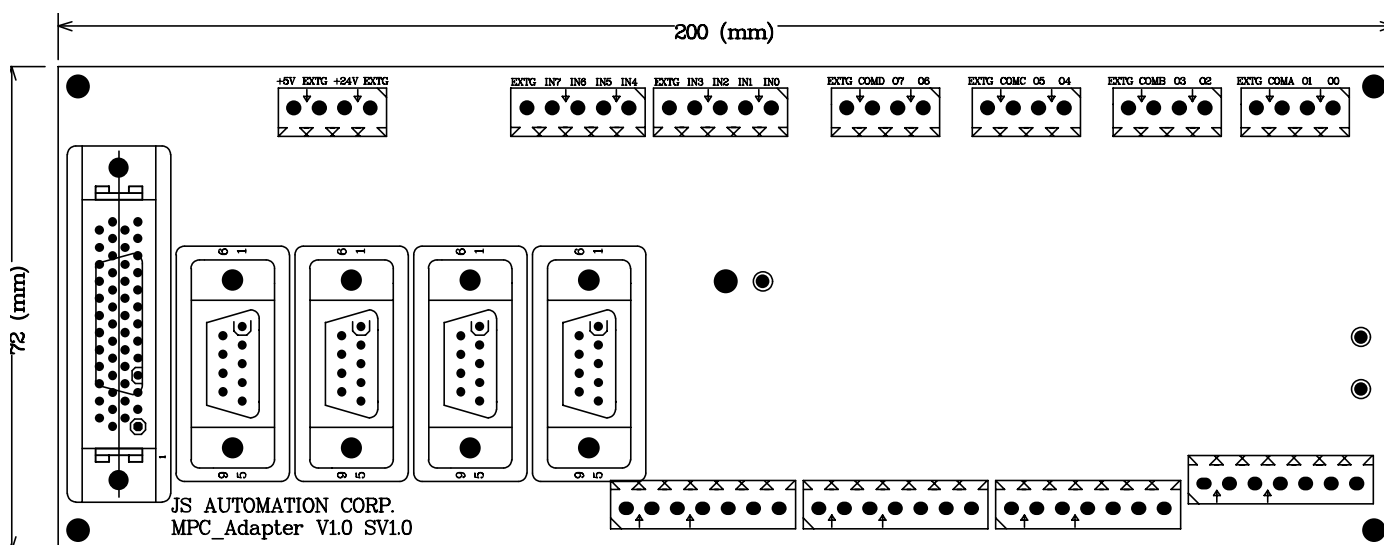
- 11.1 Control AC/DC servo motor/driver with pulse type input
- 11.2 Control various of stepping motor (PM/Hybrid/Micro-step)
- 11.3 Any combination mixed control servo and stepping motor
- 11.4 Control 4 servos with one card, easy to add on more cards to control more devices
- 11.5 As multiple of frequency generator up to 1 MHZ
- 11.6 Control precision machinery, or semi-conductor package equipment

12. DIMENSIONS

12.1 MAIN CARD DIMENSION



12.2 DIN RAIL MOUNTED WIRING BOARD

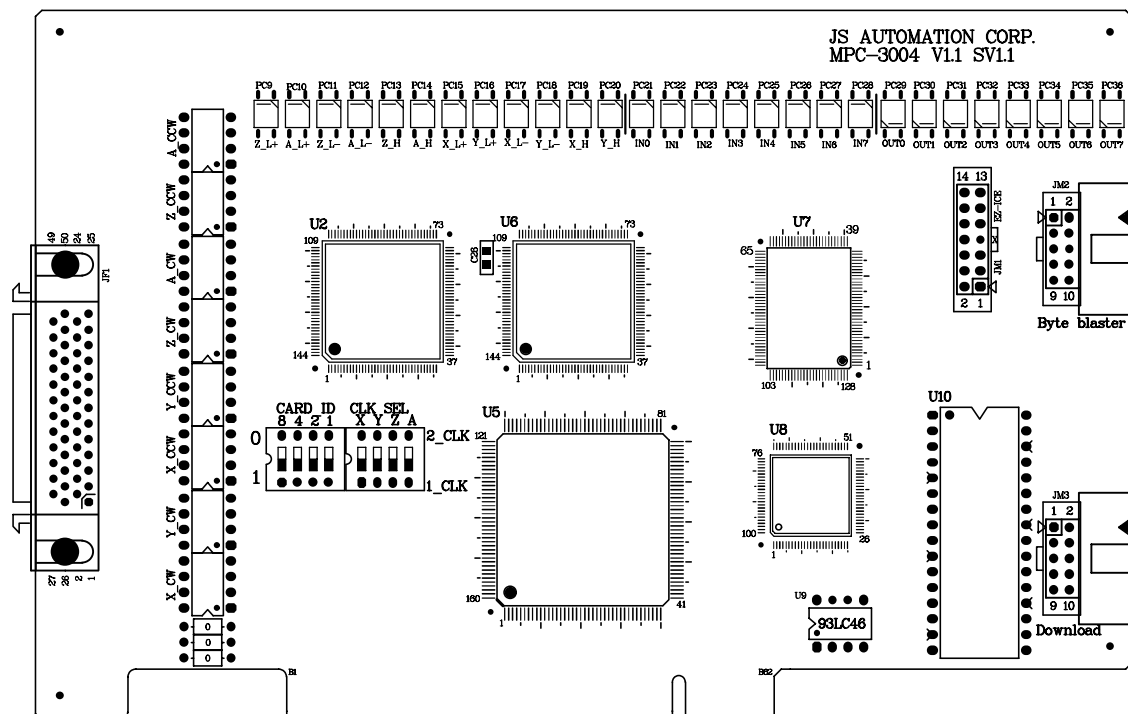


13. ORDER INFORMATION

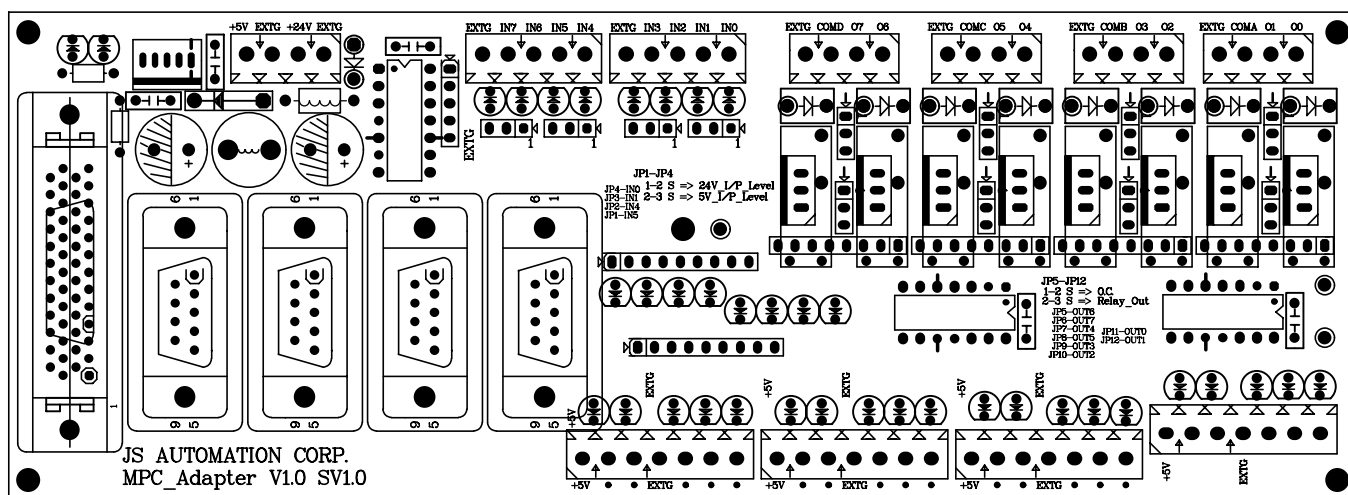
<u>PRODUCT</u>	<u>DESCRIPTIONS</u>
MPC-3004	4 axes of servo/step positioning control card
MPC-3004 DMO	Demo program of MPC-3004 card for DOS (free with user manual)
MPC-3004 WIN	Dll (VB/VC/C++ Builder) of MPC-3004 card for Win95/98/NT
MPC-3004 LVW	Vi of MPC-3004 card for LabVIEW
MPC-3004 DIN	4 axes in one DIN RAIL MOUNTED wiring board

14. LAYOUT(OLD)

14.1 MPC-3004 MAIN CARD LAYOUT

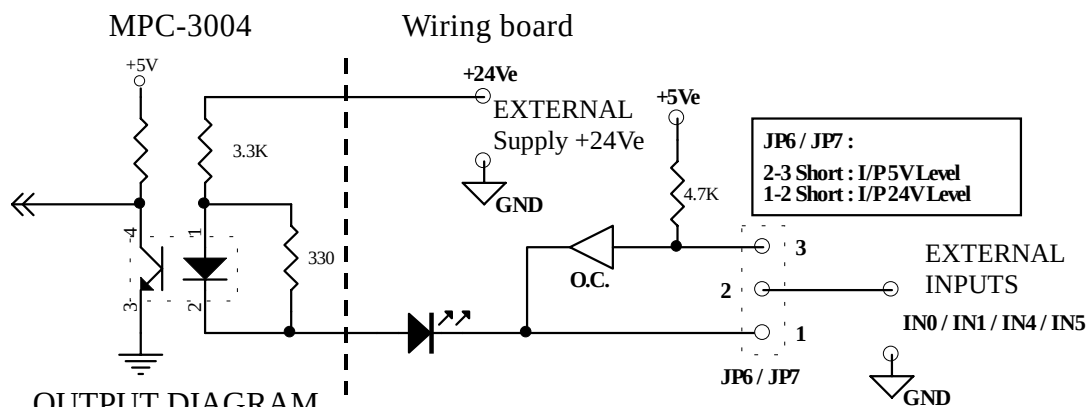


14.2 DIN RAIL MOUNTED WIRING BOARD LAYOUT

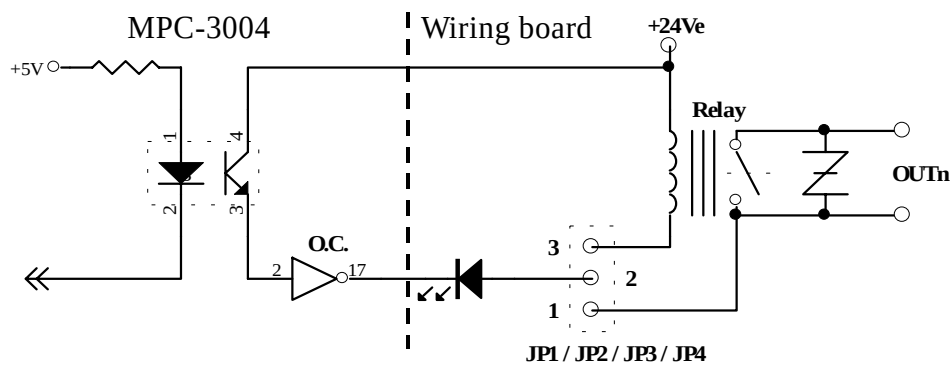


15. I/O INTERFACE DIAGRAM (OLD)

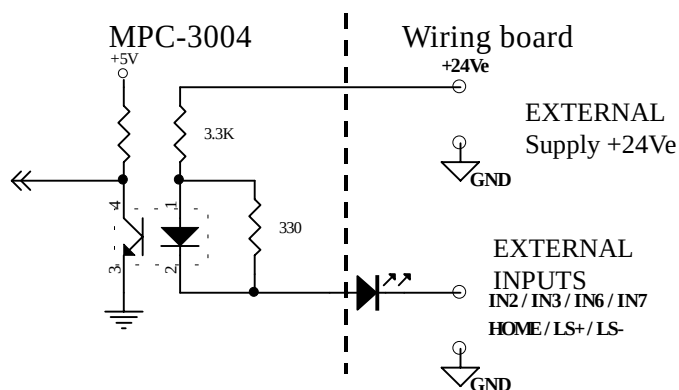
15.1 INPUT DIAGRAM



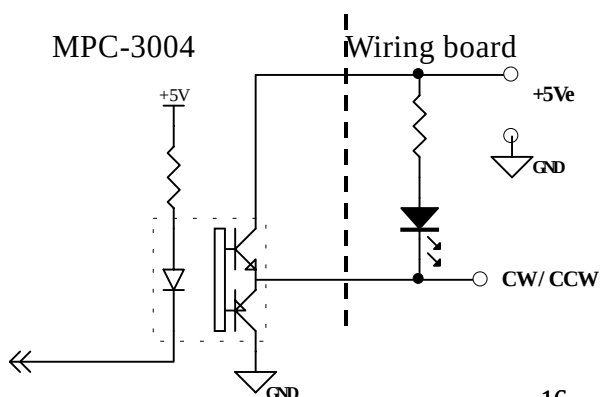
15.2 OUTPUT DIAGRAM



15.3 WIRING BOARD INPUT DIAGRAM



15.4 WIRING BOARD OUTPUT DIAGRAM



16. DIMENSIONS(OLD)

16.1 MAIN CARD DIMENSION

