User Manual

MPC2810

Rev. 1.0

Step Servo

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Preface

Thank you for buying and using Step-Servo's Leetro™ motion control cards.

MPC2810 is a high-performance general-purposed motion control card developed by Leetro Automation Co., Ltd. Please read through this manual for specifications and proper use, especially read "Safety Precautions" without fail for safety purpose.

Your motion control card has been designed to work with both servo and stepper type motors. Installation and system setup will vary depending on whether the control card will be used with stepper motors or servo motors.

Safety Warnings

Please pay attention to following warnings to avoid any injury or mechanic damage.

- **In this document, the following symbols are used to indicate the level of damages or injuries which might be incurred by the misoperation ignoring the warnings.**

 **Danger**	Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.
 **Caution**	Indicates a potentially hazardous situation which, if not avoided, will result in minor injury or property damage.

- **The following symbols represent "MUST NOT" or "MUST" operations which you have to observe.**

	Represents "MUST NOT" operation which is inhibited.

	Represents "MUST" operation which has to be executed.

Routine Safety Precautions

Please read through the routine safety precautions to avoid any injury or property damage.

Use only quality power cables.

Make a connection or disconnection correctly and securely. The power shouldn't be turned on till the wire connection completes. The control card should be connected to the terminal board first, then the motors and drives to the terminal board. To disconnect the system correctly and securely, make sure to turn off the external power supply first. Disconnect the motors and motor drives from the terminal board, and then disconnect the control cards from the terminal board.

Do not operate if there's any suspicious error. If you suspect the Product is damaged, please have it inspected by qualified technicians.

Do not subject the Product to water, corrosive or flammable gases, and combustibles.

Keep the Product from dust and humidity.

Prevent the Product from ESD damage. Do not touch the electronic components on the control cards. Do not place the control cards on surfaces possible to have ESD. Place the control cards in ESD-proof bags or packages.

Maintenance

Routine maintenance and inspection of the motion control card are essential

for the proper and safe operation.

Warranty Period

Step-Servo Co., Ltd. warrants its motion control cards against defects in materials and workmanship for a period of 12 months from the date of delivery. During the warranty period, Step-Servo will either, at its option, repair or replace products which prove to be defective.

Warranty Range

I. If the Product failed or has been damaged due to company's manufacturing and is within the warranty period, we will repair or replace it.

Following cases are exclusive from the warranty:

- Failure and damage caused by improper operation or improper operating environment.
- Failure and damage caused by the devices or the control software produced by other than our company.
- Repair and modification at other than our company.
- Failure and damage caused by natural disasters.

Customers are responsible for shipping costs to transport damaged products

Product Application

The Product is designed for general industrial applications. Step-Servo does not recommend the use of its products in life support or aircraft applications wherein a failure or malfunction of the product may directly threaten life or injury.

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1 OVERVIEW

1.1 Introduction

Leetro™ MPC2810 is a high-performance 1 to 4-axis PCI-BUB card for stepper motors and digital servo motors. Multiple MPC2810 control cards can be put in a PC to control more axes.

MPC2810 motion control card adopts IBM-PC and its compatible PC as the host computer. It is a PC-based upper control unit for stepper motor and digital servo motor.

Applied the advanced Field Programmable Gate Array (FPGA), MPC2810 provides dedicated motion control features such as pulse/direction or CW/CCW signal output, forward/reverse limit and origin input for each axis, acceleration-deceleration control, linear and circle interpolations, and much more. For step motors, pulse output rate up to 2.0 MHz provides fast and smooth motion for full step or microstepping drives.

Based on MPC2810's powerful functions and Windows DLL, the user can develop various motion control system easily. Lib database, leader files and module declare files are applicable for current popular programming development tools-Visual Basic6.0 and Visual C++6.0. MPC2810's functions are also conveniently applicable for other 32-b Windows development tools such as Delphi, C++ Builder, and etc. Moreover, the configuration software that supports Windows DLL can also use MPC2810 motion controller.

MPC2810 motion control card is widely applied to: the laser processing machines, the CNC machines, the processing center, the robots, the X-Y-Z control set; the painting instruments, the engraving machines, the printing

machines, the feeding machines, the marking machines, the coiling machines, the medical machines, the packing machines, the textile machines, the woodworking machines and the assemble line.

1.2 Model Designation

MPC series general-purposed motion controller:

1.3 Features

- Motion modes

  Two modes available such as batch processing, and immediate processing.
- Interpolation of continous micro-line segments trajectories

  Look-ahead capability realizes high-speed and smooth interpolation of continous micro-line segments trajectories
- High-speed

  Pulse output to 2Mpps.
- Working stroke

  32-bit (±2147483647) pulse counter.
- Encoder

  2-CH 3-phase (A/B/Z phase) encoder inputs.
- Anti-interference

  Opt-isolated digital I/Os ensuring the anti-interference ability of MPC2810.
- Abundant general-purposed outputs and inputs

  Besides the special I/Os for each axis, the card has 24 general-purpose outputs (500mA driving capability for each CH), and 19 general-purpose inputs. With origin, limit, deceleration and alarm

inputs which can be set as general-purpose inputs inclusive, there can be up to 36-CH general-purpose inputs.

- Interpolations

  2 to 4-axes linear interpolation and 2-axes circular interpolation

- Event processing

  Internal events can be triggered automatically once the motion control card receives signals such as forward limit, reverse limit, origin, Z pulse, encoder position latching, stop, alarm, etc. User can define event processing program.

- Comparative position control output

  Interface commands are used for setting the general outputs 1-4 as comparative position control outputs.

- Encoder latch

  MPC2810 motion controller can latch encoder feedback signals of 1-Ch and 2-Ch.

- Destination check

  Automatic destination error compensation

- Set acceleration-deceleration

  User can easily set acceleration-deceleration process if the default T/S-curve modes can not satisfy user’s requirements.

- Input interface for manual pulse generator
- Electronic gearing
- Watchdog timer
- Software limits

1.4 Specifications

Form 1-1 MPC2810 Motion Control Card Specs

Item	MPC2810
Main interface	PCI (3.3 or 5V）
Axes	1 to 4 axes
Encoder inputs (CH)	2-CH
Encoder counter	2-CH, 32bit ±2147483647, A/B/Z phase（2Mpps）, Differential interface
General digital inputs	DC24V 19 opto-isolated inputs
General digital outputs	24 outputs, 500mA max open collector
Specialized inputs	4 inputs each axis (forward limit, reverse limit, origin, deceleration), Alarm (Common)
Max. pulse output frequency	2MHz
Min.pulse output frequency	0.02Hz
Output pulse shape	Trapezoidal or S-curve drive of slow-up/slow down control, user-defined curve of slow-up/slow down control.
Pulse output mode	Pul/Dir output (Pulse/Direction), or CW/CCW
Output pulse counter	32bit ±2147483647 each axis
Min. effective pulse width of Z-axis	0.5μs
Multiple cards applicable	4 cards
Variable speed	Speed changes on-the-fly
Watchdog timer	Timer range: 1～120000 ms
Tracking error limit	Tracking error limit can be set for axis1 and axis2 (Allowable error: ±16777216)
Operation System	WINDOWS 2000、WINDOWS XP

1.5 Typical Control System

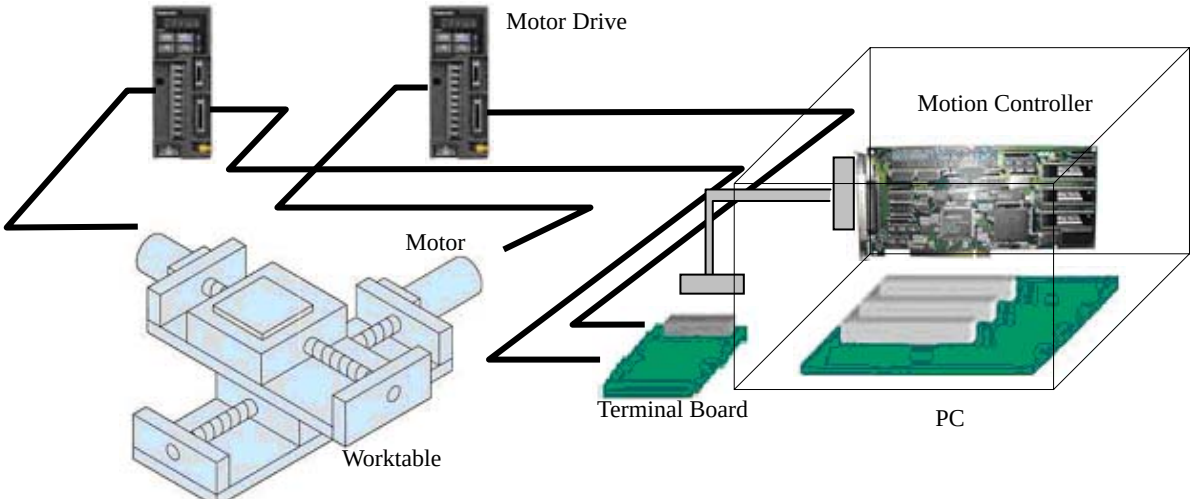


Fig.1-1 Controlling System Applying MPC2810

Typical motion control system applied MPC2810 motion control card is composed of:

1) MPC2810 motion control card, terminal board and connect cable;
2) PC or industrial control computer with PCI slot, Windows2000/XP operation system;
3) Stepper motor or digital servo motor;
4) Motor drives;
5) Power supplies for motor drives;
6) DC switch power supply, providing +24V power to the terminal board.

2 Quick Installation

2.1 Check Your Package

Upon opening the product package, please make sure the model is what you have ordered, if the product and its components are damaged or not during the transportation, if the accessories are attached or not. Contact your supplier immediately if you find any failures.

Standard accessories list:

- 1* MPC2810 motion control card;
- 1* P62-01 terminal board;
- 1* 62-pin shielded cable, 2m;
- 1* Software toolkit.

If the user needs more general-purpose I/O ports, please refer to the following optional accessories:

- 1* C4037 general-purpose I/O extension cable;
- 1*P37-05 terminal board;
- 1*37-pin shielded cable, 2m.

2.2 MPC2810/P62-01/P37-05 Layout

(1) MPC2810 motion control card

4 indicator lights on the back of the board

J1: connect interface for 62-pin shielded cable

J2: connect interface for 40-pin flat cable of general IO extension board

Switch: used for setting the local ID of cards if multiple cards are applied.

Custom or OEM requirements can be easily reached based on FPGA technology.

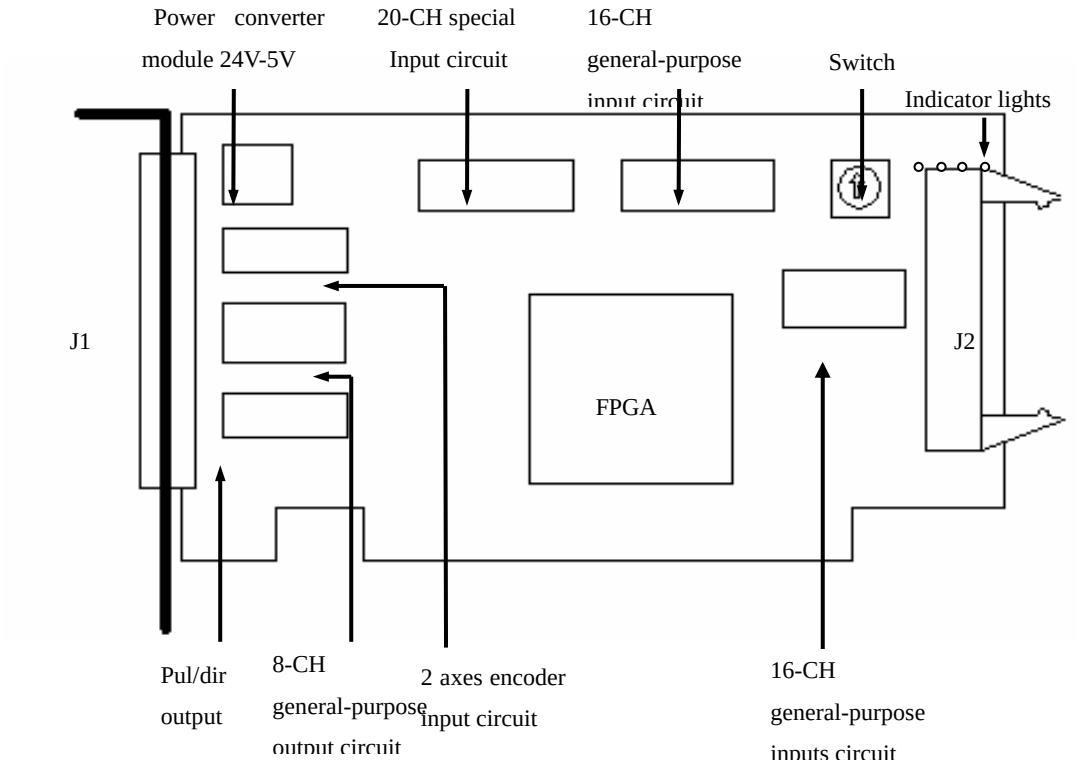


Fig. 2-1 MPC2810 Layout Diagram

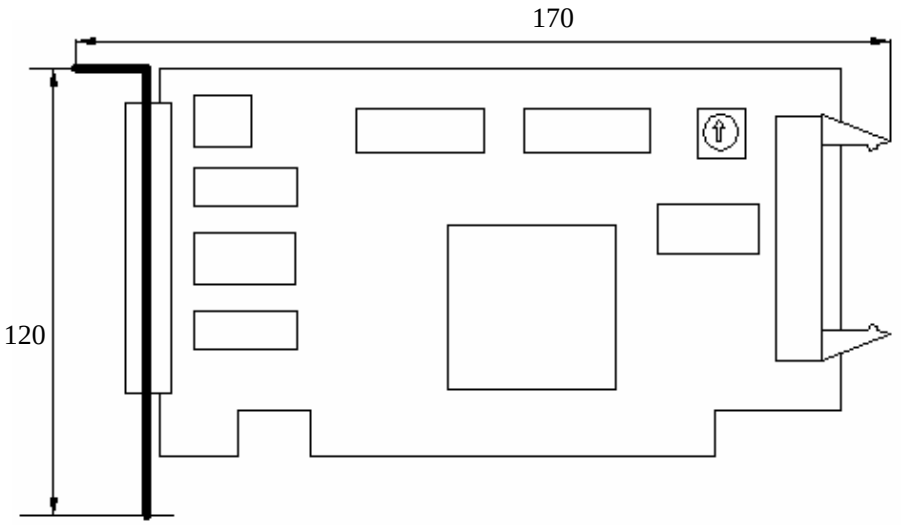


Fig. 2-2 MPC2810 Dimensions (mm×mm)

（2）Terminal board-P62-01 for MPC2810

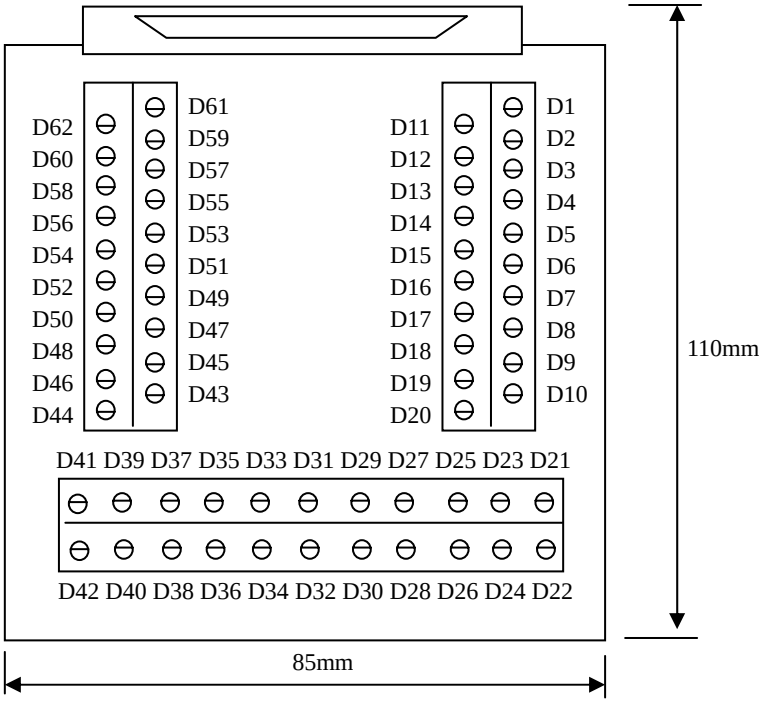


Fig. 2-3 P62-01 Terminal Board

P62A Dimensions: (mm×mm)

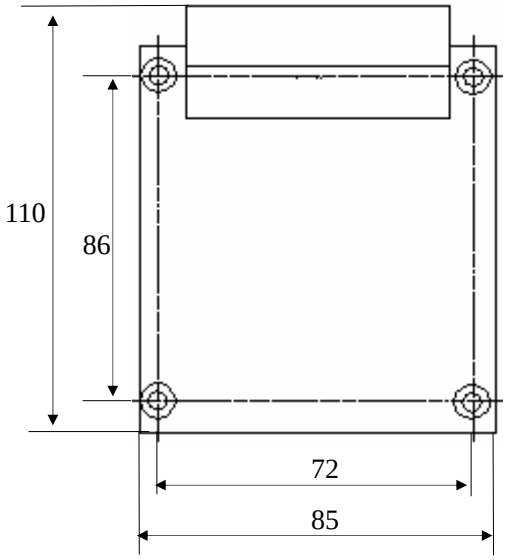


Fig. 2-4 P62-01 Dimensions

Mounting Hole Dimensions: ϕ3mm.

（3）Terminal board-P37-05 for I/O extension board (mm×mm)

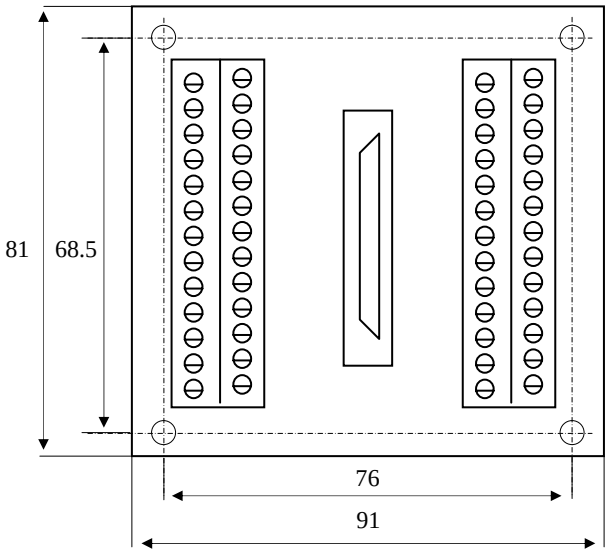


Fig. 2-5 P37-05 Terminal Board

Mounting Hole Dimensions: ϕ3.5mm.

2.3 Hardware Installation

PC hardware requirements:

- X86 compatible PC with PCI slot
- 486+ CPU
- 64M+ Memory

Hardware Installation Steps:

1) Plug motion control card to the PCI-slot of the PC.

Caution	Do not touch any controller circuits or plug-pull controller until you touch a grounded metal object to have the electrostatic charge of your body released. Failure to observe this instruction could result in damages.

2) Connect the motion control card to the terminal board
3) Connect the motor to motor drive
4) Connect motor drive to terminal board

Danger	Execute the trial run without connecting the motor to the machine system and adjust the parameters of control card and motor drives, then fix the motor. After checking the operation, connect to the machine system again. Failure to observe this instruction could result in injuries.

2.4 Software Installation

The motion control card can be operated on Win2000 and WinXP operating systems. Windows can automatically detect the MPC2810 plugged into the PC, and its Plug-and-Play capability will automatically install the card. When you see the pop-up dialog box indicating that new device is found, please click “cancel” and install the driver, function storehouse and demo programs as following steps:

1) Click “Cancel” when the system indicates “Unknown PCI Device” found.
2) Run setup program under root directory of installation CD. Then click “Next” to continue the installation.

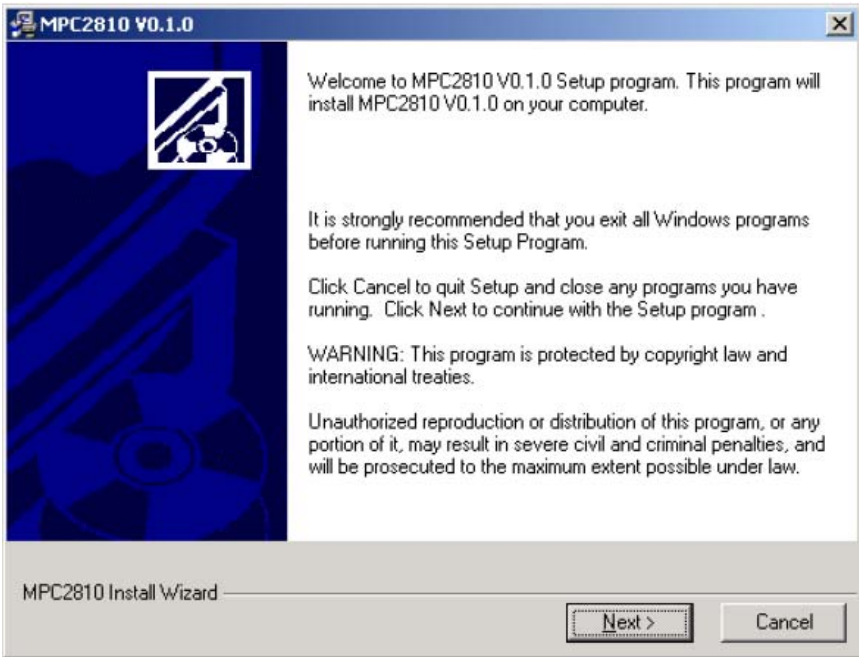


Fig. 2-6 Welcome window

3) Select components to be installed.

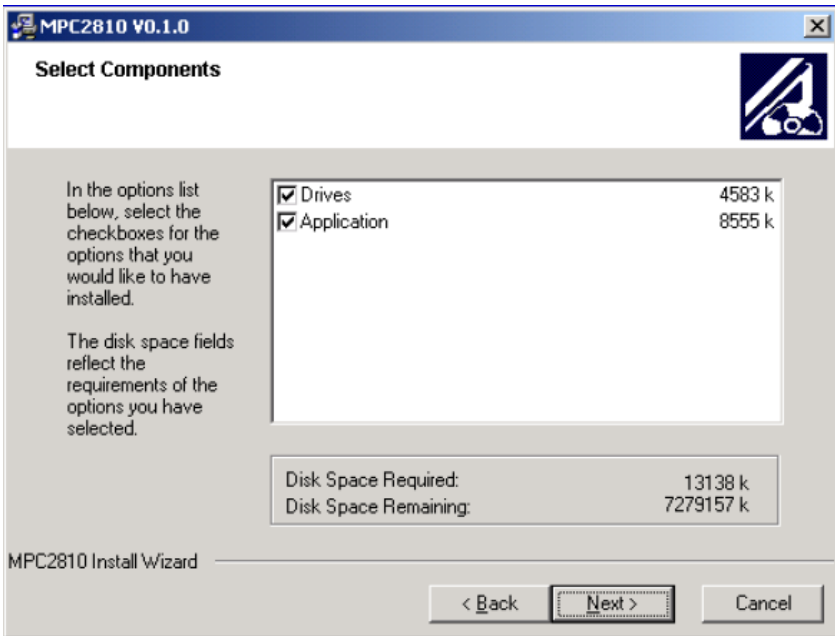


Fig. 2-7 Select components window

4) Select the destination location of installation files. Default path: ***C:\Program Files\MPC2810.*** Click **Browse** to choose a preferred path.

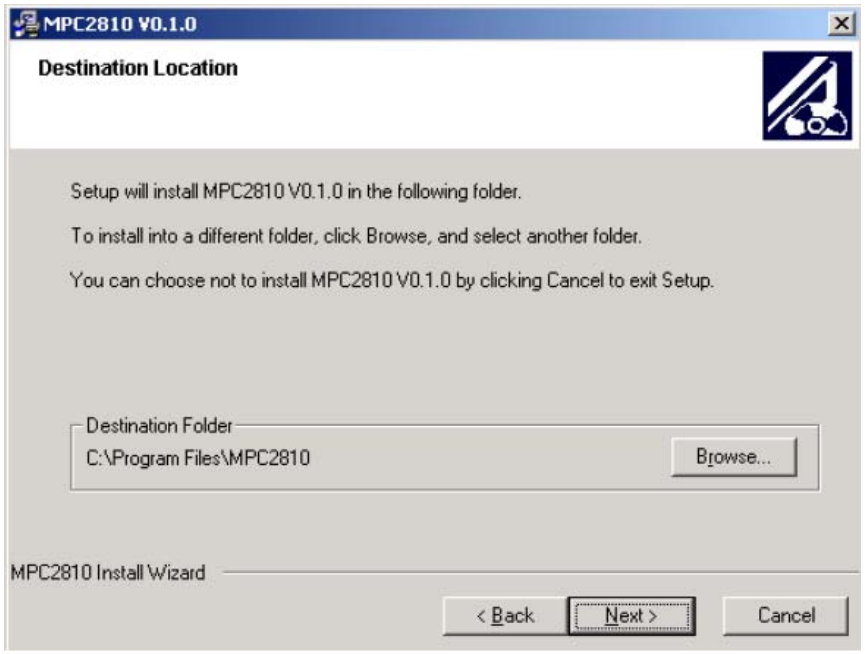


Fig. 2-8 Choose destination location window

5) Click **Next** to start the installation.

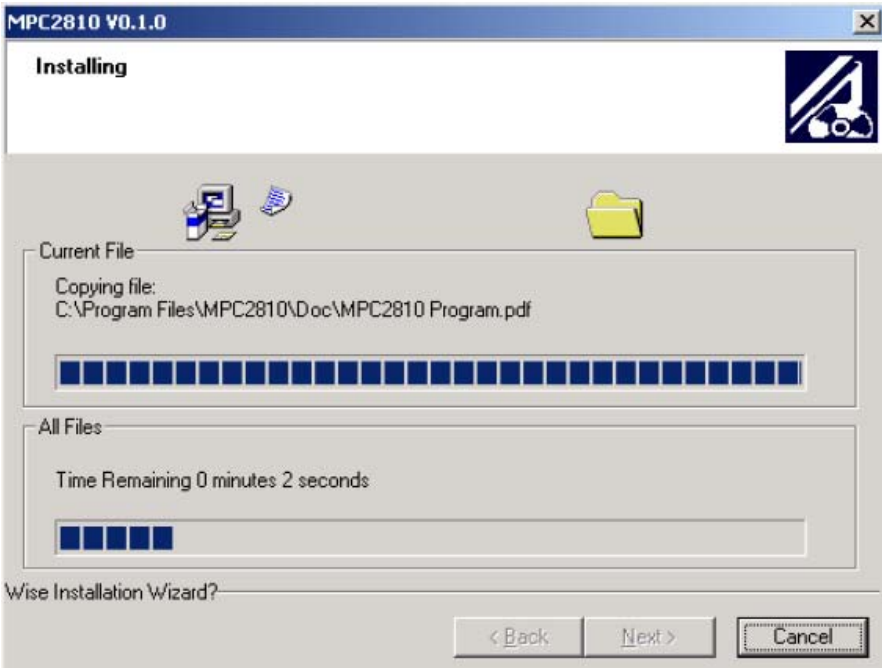


Fig. 2-9 Copying files

6) Finish the installation. Click **Finish** to complete the installation.

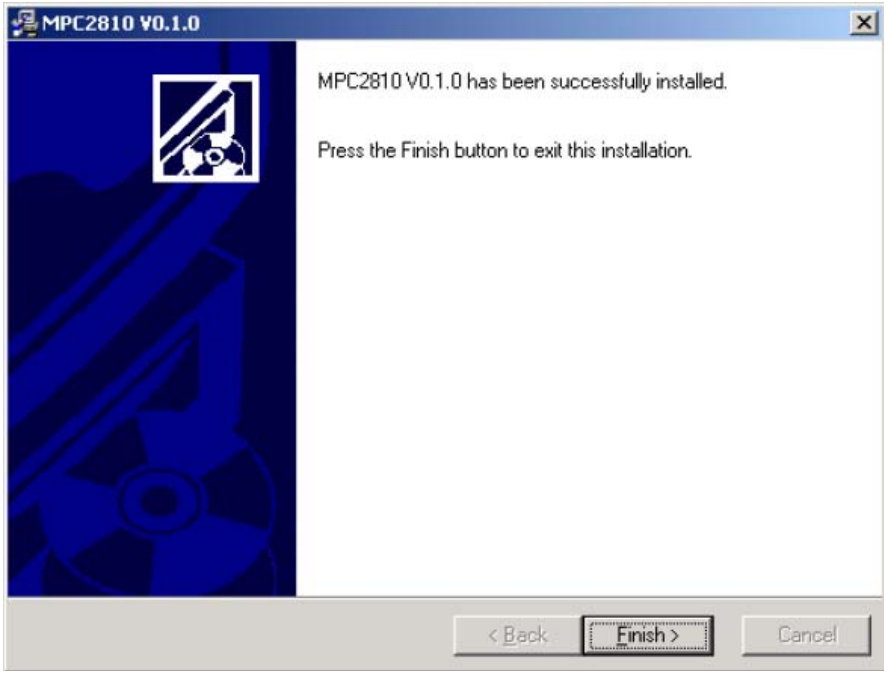


Fig. 2-10 Installation completed

7) When the installation completed, system will indicate to restart the computer. Click **OK** to have the system restarted immediately. If you want to restart the system later, click **Cancel.** MPC2810 can only be used after the system restarted.

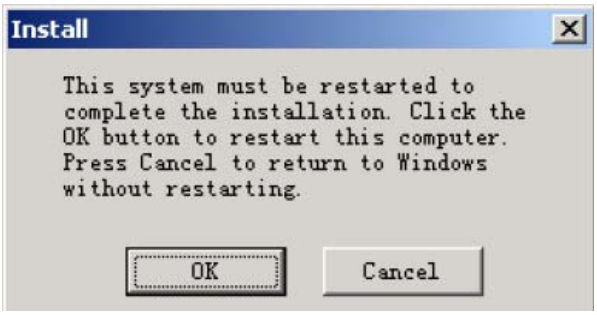


Fig. 2-11 Restart indication dialog box

8) To check if the installation completed successfully, open the MPC2810 folder located in destination path. You can see following files.

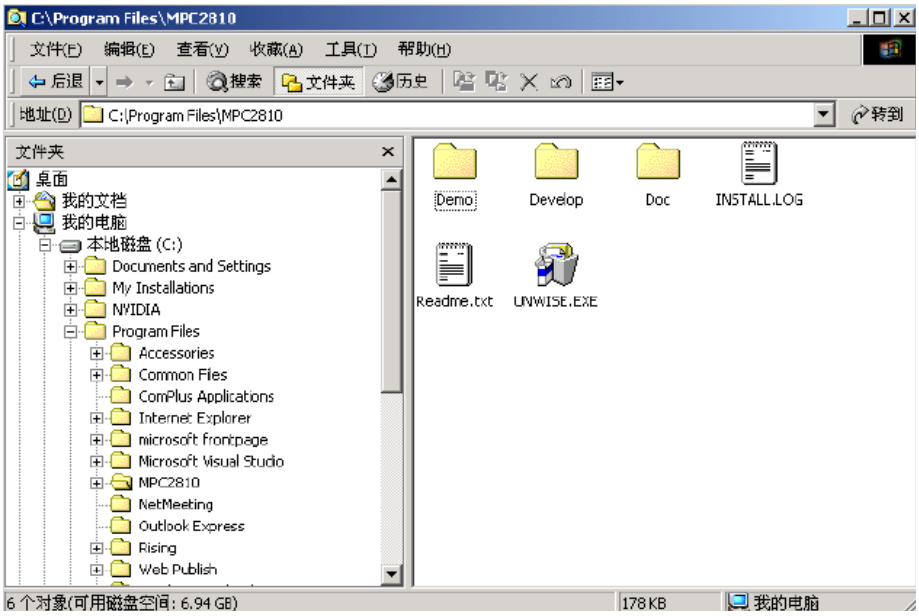


Fig. 2-12 MPC2810 directory structure

A. Demonstration programs in “Demo” directory:

a) Sub-directory “VBDemo”: source code VB examples (“Demo1” and “Demo2”);

- Run “VBDemo1.exe”, following dialog box pops up:

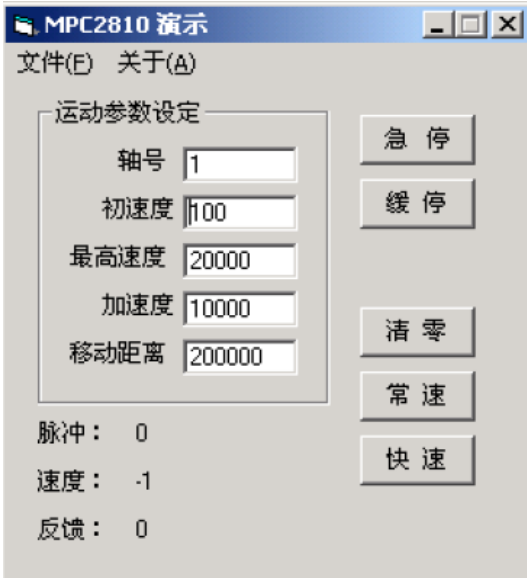


Fig. 2-13 VBDemo1 window

With VBDemo1 example program user can primarily test the control system and easily learn how to develop MPC2810. Click **About** to learn how many MPC2810 are applied as well as the hardware and software version information.

- Run “VBDemo2”, following motion control performance window will be shown as follows:

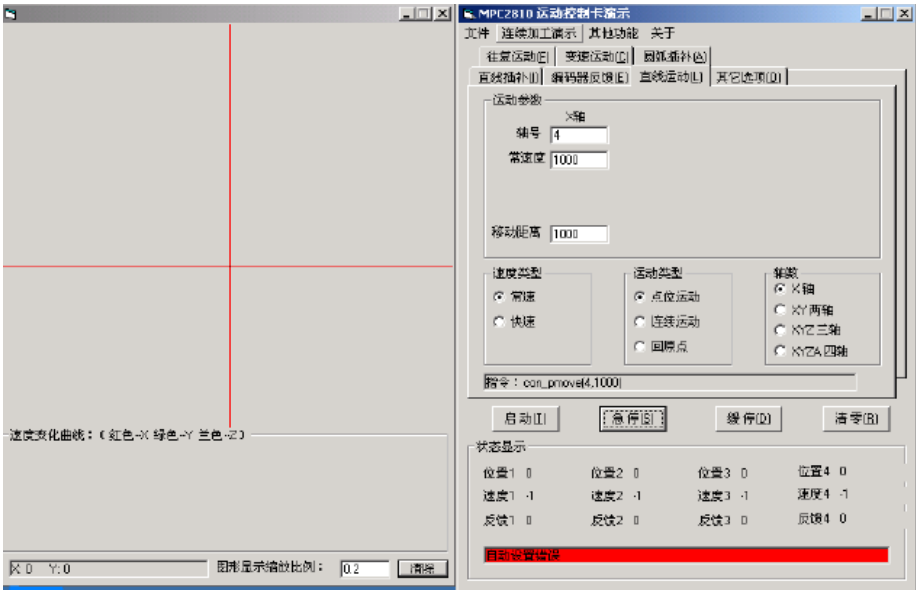


Fig. 2-14 VBDemo2 window

Motion track and speed curve are shown in the left frame. Parameters settings on the linear/circular interpolation, the jogging& jigging motion and the encoder are shown in the right frame. The frame OTHERS is used for testing general I/Os and special inputs.

b) 7 demonstration programs in sub-directory ***VCDemo***:

- source code examples “Demo1” and “Demo2”. “Demo1” is the VC static and dynamic link library example; “Demo2” is VC dynamic+ dynamic-link-library example. Windows of VCDemo1 and VCDemo2 are the same as follows:

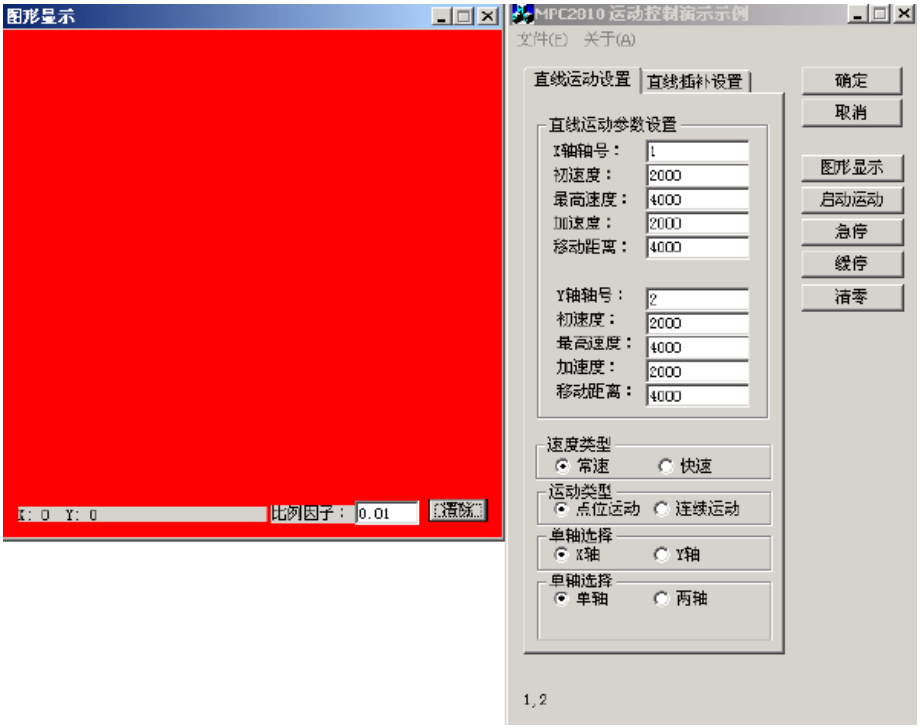


Fig. 2-15 VCDemo1/VCDemo2 window

Motion track will be shown on the left-side in the window, while parameter settings shown on the right-side in the window.

- "Demo3" provides no source code. It can execute G-code file, read *.DXF file, test I/O & commands. (Refer to **Chapter4**)
- "CmdMove1" demonstrates batch processing and short line segments tracking examples.

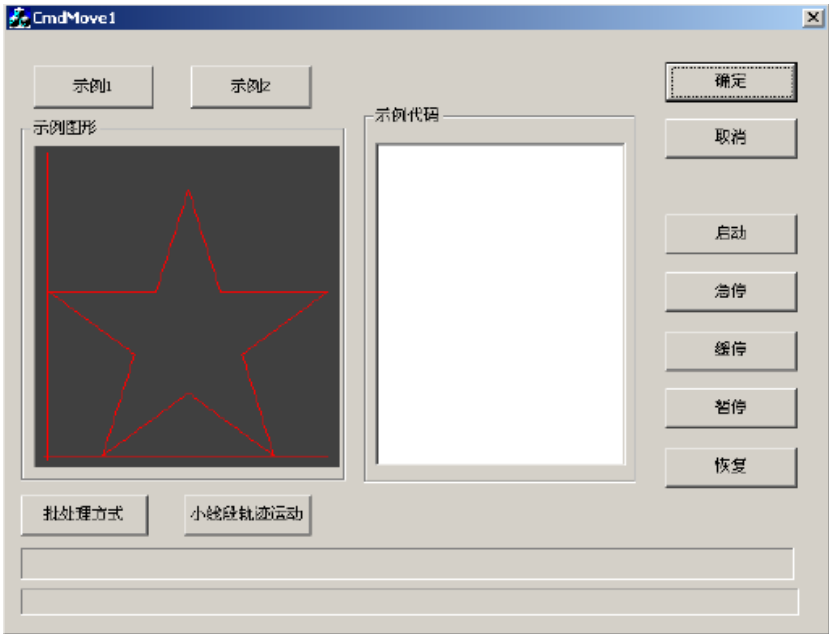


Fig. 2-16 CmdMove1 window

■ "HandwheelorGearHandle" demonstrates manual pulse input and electronic gearing examples.

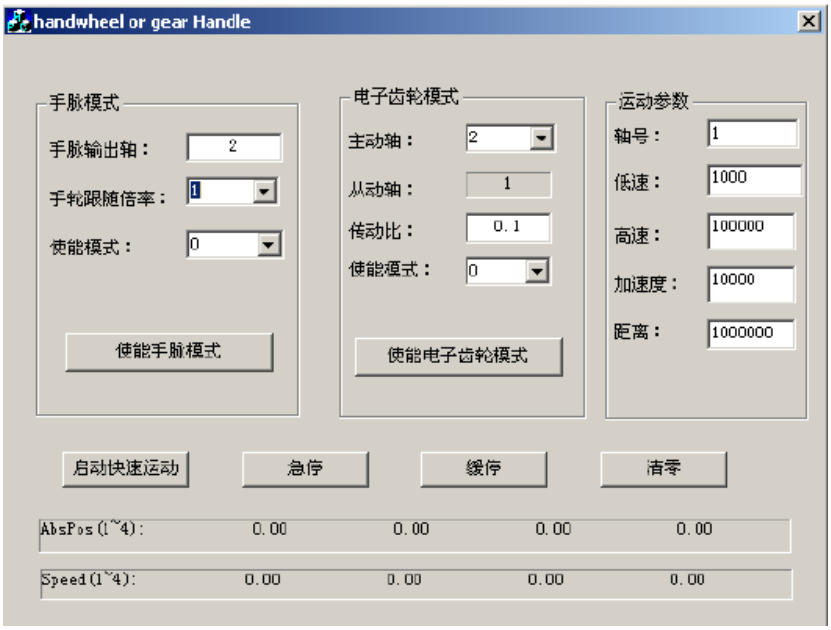


Fig. 2-17 HandwheelorGearHandle window

- “InterruptHandle” demonstrates interrupt example.

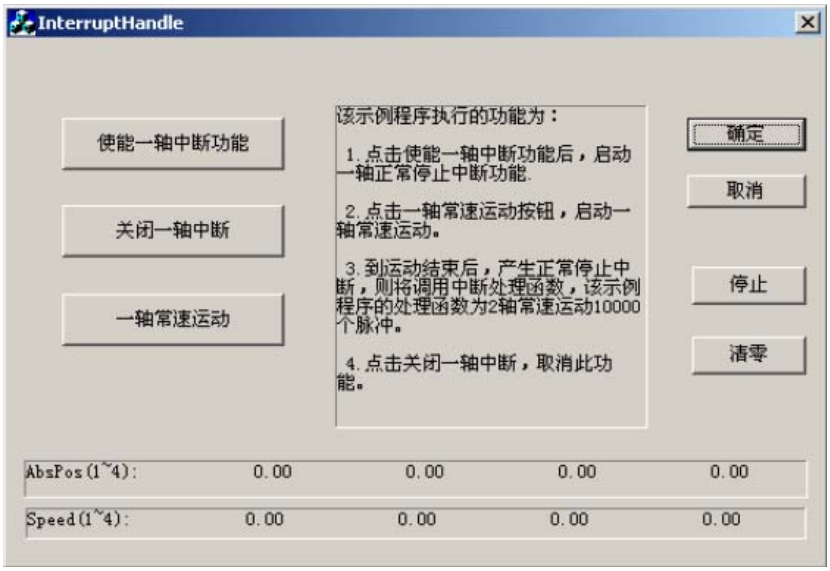


Fig. 2-18 InterruptHandle window

- “FastMoveDemo” demonstrates how to apply T-curve, S-curve and custom acceleration-deceleration to fast motion when batching processing.

Fig. 2-19 FastMoveDemo window

B. **Develop** directory: MPC2810 driver programs and functions storehouse.

   a) Sub-directory “Common”: MPC2810 driver program and functions storehouse;

   b) Sub-directory “VB”: Module file MPC2810.bas used for developing VB execution program

   c) Sub-directory “VC”: file used for dynamically loading dynamic link library(“LoadMPC2810.cpp” and “LoadMPC2810.h”) and file used for static and dynamic link library (“MPC2810.h” and “MPC2810.lib”).

C. Doc: User Manual and Programming Manual.

2.5 Uninstall software

There are two ways to uninstall the MPC2810 program:

1) Run **UNWISE.exe** in the MPC2810 folder.
2) Control Panel→ Run “Add/Remove Programs” to uninstall the MPC2810 program.

3 How to Use

3.1 Parameter Setup

The Diale (U55) on the control card can be used for setting the local ID of each card if multi cards are applied. The value ranges from 0x0H to 0xFH. Please refer to the Diale and local ID correspondence table 3-1.

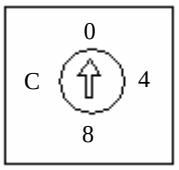


Fig. 3-1 U55 Diale

Table 3-1 Diale and Local ID Correspondence Table

Value of Diale	Local ID No. (Card No.)
0x0H	1
0x1H	2
0x2H	3
0x3H	4

Maximum 4 cards can be applied. Maximum ID number should be 0x3H.

If only one card applied, the ID should be 0x0H (default setting).

If four cards are applied, 0x0H should be the ID of the first card, 0x1H to the second card, 0x2H to the third card, and 0x3H to the fourth card.

3.2 Signal Interface

3.2.1 Terminal Board-P62-01

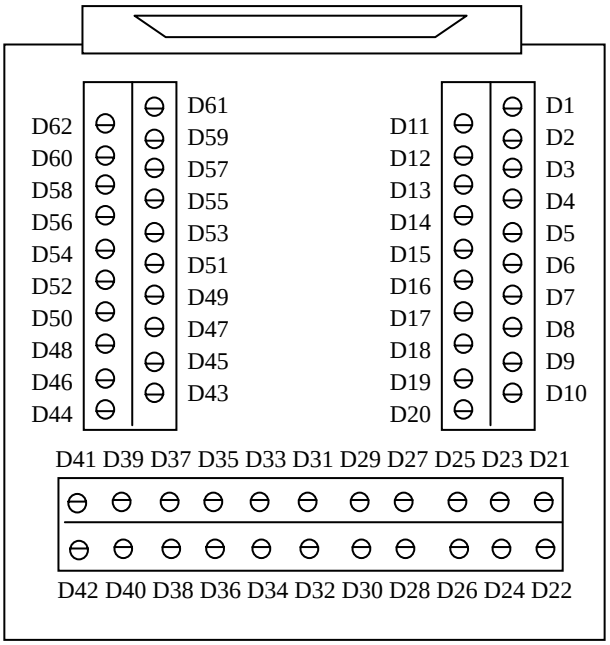


Fig. 3-2 P62-01 Terminal Board Layout Diagram

Table 3-2 Terminal Board Interface Description

P62-01	62-pin cable	Name	Description
D1	42	DCV5V	+5V output(max current:500mA), common ground with DCV24V, can be disconnected
D2	21	DCV24V	+24V, input(MUST)
D3	20	OGND	24V GND, input(MUST)
D4	62	SD1	Deceleration 1
D5	41	EL1-	Reverse Limit 1
D6	19	EL1+	Forward Limit 1
D7	61	ORG1	Origin 1
D8	40	SD2	Deceleration 2

D9	18	EL2-	Reverse Limit 2
D10	60	EL2+	Forward Limit 2
D11	39	ORG2	Origin 2
D12	17	SD3	Deceleration 3
D13	59	EL3-	Reverse Limit 3
D14	38	EL3+	Forward Limit 3
D15	16	ORG3	Origin 3
D16	58	SD4	Deceleration 4
D17	37	EL4-	Reverse Limit 4
D18	15	EL4+	Forward Limit 4
D19	57	ORG4	Origin 4
D20	36	ALM	Alarm
D21	14	IN17	General-purpose input 17
D22	56	IN18	General-purpose input 18
D23	35	IN19	General-purpose input 19
D24	13	-DIN1	Encoder A1- (CW/CCW Pulse: Pul 1-)
D25	55	+DIN1	Encoder A1+ (CW/CCW Pulse: Pul 1+)
D26	54	-DIN2	Encoder B1- (CW/CCW Pulse: Dir 1-)
D27	34	+DIN2	Encoder B1+(CW/CCW Pulse: Dir1+)
D28	33	-DIN3	Encoder Z1-
D29	12	+DIN3	Encoder Z1+
D30	11	-DIN4	Encoder A2- (CW/CCW Pulse: Pul 2-)
D31	53	+DIN4	Encoder A2+(CW/CCW Pulse: Pul 2+)
D32	52	-DIN5	Encoder B2- (CW/CCW Pulse: Dir 2-)
D33	32	+DIN5	Encoder B2+(CW/CCW Pulse: Dir 2+)
D34	31	-DIN6	Encoder Z2-
D35	10	+DIN6	Encoder Z2+
D36		COM1_8	Absorption circuit, can be disconnected
D37	30	OUT1	General-purpose output 1
D38	51	OUT2	General-purpose output 2
D39	50	OUT3	General-purpose output 3
D40	8	OUT4	General-purpose output 4
D41	49	——	reserve
D42	29	OUT5	General-purpose output 5
D43	7	OUT6	General-purpose output 6
D44	28	OUT7	General-purpose output 7

D45	48	OUT8	General-purpose output 8
D46	27	-DOUT1	Axis-1 direction-
D47	6	+DOUT1	Axis-1 direction +
D48	5	-DOUT2	Axis-1 pulse -
D49	47	+DOUT2	Axis-1 pulse +
D50	26	-DOUT3	Axis-2 direction -
D51	4	+DOUT3	Axis-2 direction +
D52	46	-DOUT4	Axis-2 pulse -
D53	25	+DOUT4	Axis-2 pulse +
D54	45	-DOUT5	Axis-3 direction -
D55	3	+DOUT5	Axis-3 direction +
D56	2	-DOUT6	Axis-3 pulse -
D57	24	+DOUT6	Axis-3 pulse +
D58	44	-DOUT7	Axis-4 direction -
D59	23	+DOUT7	Axis-4 direction +
D60	1	-DOUT8	Axis-4 pulse -
D61	43	+DOUT8	Axis-4 pulse +
D62	22	——	reserve

3.2.2 General-purpose I/O Extension Cable-C4037

16 general inputs and 16 general outputs can be extended with C4037. Connect MPC2810 to external 37-pin cable through the C4037.

For the convenience of wiring, the I/O extension terminal board P37-05 is applicable.

Table 3-3 P37-05 Interface Description

P37-05 terminal board	37-pin cable	Name	Description
P19	19	IN1	General-purpose input 1
P37	37	IN2	General-purpose input 2
P18	18	IN3	General-purpose input 3
P36	36	IN4	General-purpose input 4
P17	17	IN5	General-purpose input 5
P35	35	IN6	General-purpose input 6
P16	16	IN7	General-purpose input 7

P34	34	IN8	General-purpose input 8
P15	15	IN9	General-purpose input 9
P33	33	IN10	General-purpose input 10
P14	14	IN11	General-purpose input 11
P32	32	IN12	General-purpose input 12
P13	13	IN13	General-purpose input 13
P31	31	IN14	General-purpose input 14
P12	12	IN15	General-purpose input 15
P30	30	IN16	General-purpose input 16
P11	11	OUT9	General-purpose output 9
P29	29	OUT10	General-purpose output 10
P10	10	OUT11	General-purpose output 11
P28	28	OUT12	General-purpose output 12
P9	9	OUT13	General-purpose output 13
P27	27	OUT14	General-purpose output 14
P8	8	OUT15	General-purpose output 15
P26	26	OUT16	General-purpose output 16
P7	7	COM9_16	Absorption circuit, can be disconnect
P25	25	DCV24	Output +24V output current to 500mA
P6	6	OUT17	General-purpose output 17
P24	24	OUT18	General-purpose output 18
P5	5	OUT19	General-purpose output 19
P23	23	OUT20	General-purpose output 20
P4	4	OUT21	General-purpose output 21
P22	22	OUT22	General-purpose output 22
P3	3	OUT23	General-purpose output 23
P21	21	OUT24	General-purpose output 24
P2	2	COM17_24	Absorption circuit, can be disconnect
P20	20	DCV24	Output +24V output current to 500mA
P1	1	OGND	Output 24V GND

3.3 Connection

3.3.1 Connect MPC2810 to P62-01

Power off the PC

Plug MPC2810 into the PCI-slot of the PC

Connect JP1 interface of MPC2810 to J1 interface of P62-01 with the 62-pin shielded cable as shown in figure 3-3:

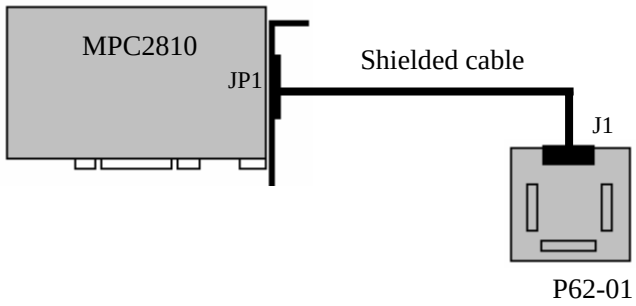


Fig. 3-3 Connect Motion Control Card To Terminal Board

3.3.2 Connect P2810 to Power Supply

Connect D2 and D3 of P62-01 to a 24V switching power supply (D2 to +24V, D3 to 24V GND).

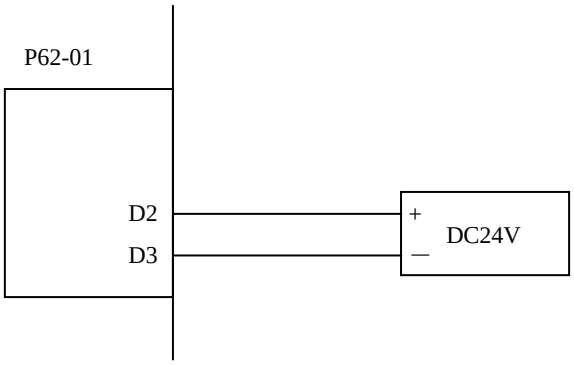


Fig. 3-4 Connect Terminal Board to Power Supply

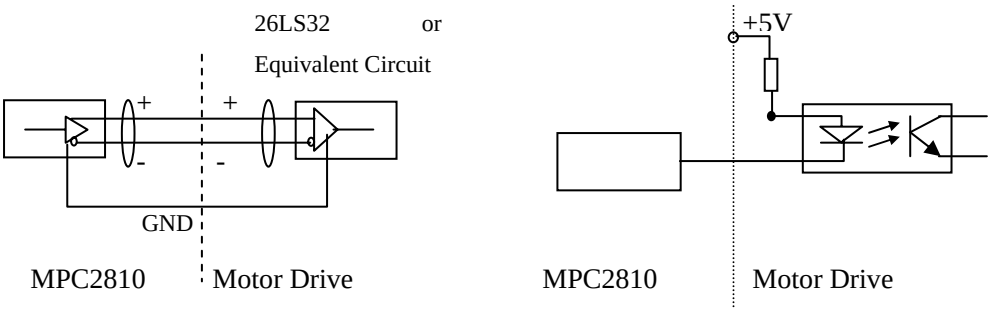
3.3.3 Connect P62-01 to Motor Drive

3.3.3.1 Outputs

Two pulse output modes for MPC2810: Pul/Dir, and CW/CCW. Default

mode is Pul/Dir. User can change the output mode of each axis using "set_outmode" command.

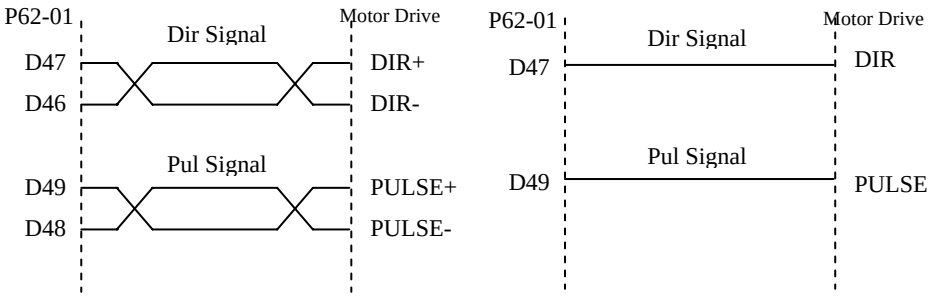
(Refer to Programming Manual).



(a) Connect to Differential Signals (b) Connect to Single-ended Signals

Fig. 3-5 Wiring of Controlling Signals

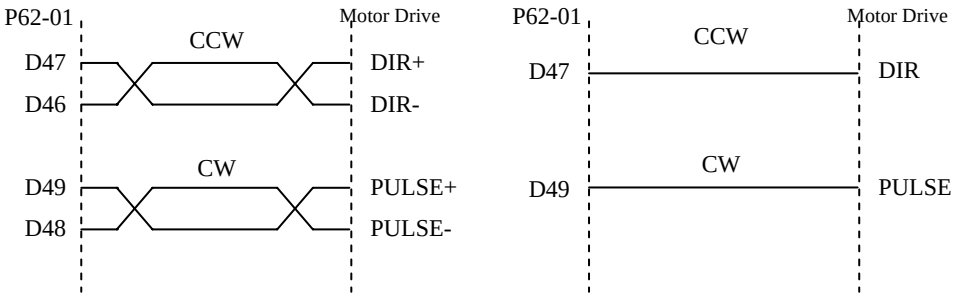
1) Pul/Dir Mode



（a）Differential Pul/Dir Mode （b）Single Pul/Dir Mode

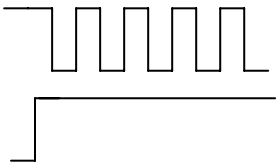
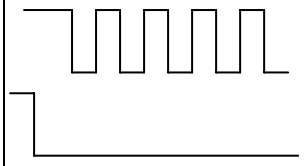
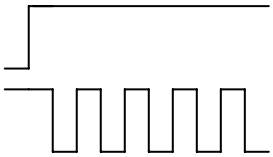
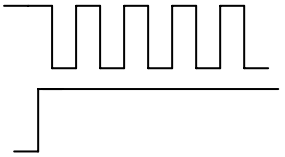
Fig. 3-6 Pul/Dir Output

（2）CW/CCW Mode



（a）Differential Pul/Dir Mode （b）Single CW/CCW Mode

Fig. 3-7 CW/CCW Output

Output Mode	Pin	CW	CCW
Pulse + Direction	D46~D61		
CW Pulse + CCW Pulse	D46~D61		

3.3.3.2 Connect Encoder Inputs

2-CH encoder interfaces receiving A-phase, B-phase and Z-phase signals are available. D28, D29 (axis 1) and D34, D35 (axis 2) function as the differential ports for encoder latching inputs once the encoder latching functionality activated. Please refer to Fig.3-8, the connection diagram. Fig. 3-9 shows the connection example provided encoder latch signals are single-ended.

CW/CCW mode: Connect external pulse signal to the pulse input port of corresponding A-phase, and the external direction signal to pulse input port of corresponding B-phase.

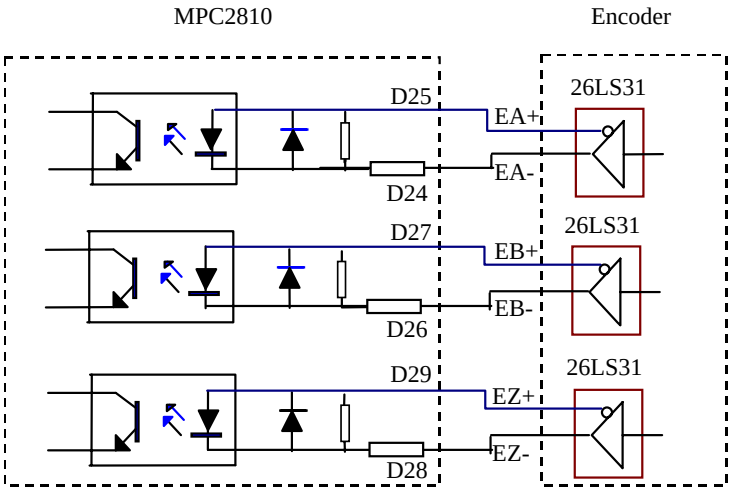


Fig. 3-8 Connection Diagram of Encoder Inputs (Differential-ended)

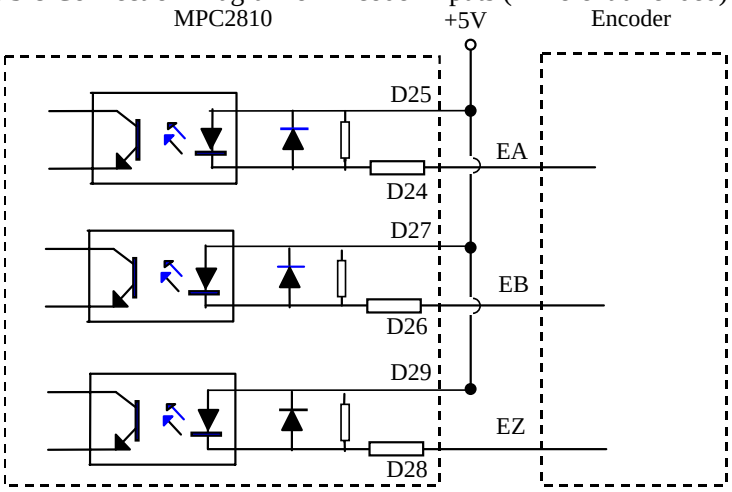


Fig.3-9 Connection Diagram of Encoder Inputs(Single-ended)

3.3.3.3 Connect Special Inputs

	Alarm input, limit input, origin input and deceleration signal are default normally-close (making a short-circuit to 24V GND if the inputs are not in use)

Special switch inputs include: limit, deceleration, origin and external alarm signals. Switch could be contact switch or NPN-output sensor proximity switch.

The connection diagram is as follows.

No special switch outputs for MPC2810. User can set output1~4 as comparative position output ports using the command ***enable_io_pos***

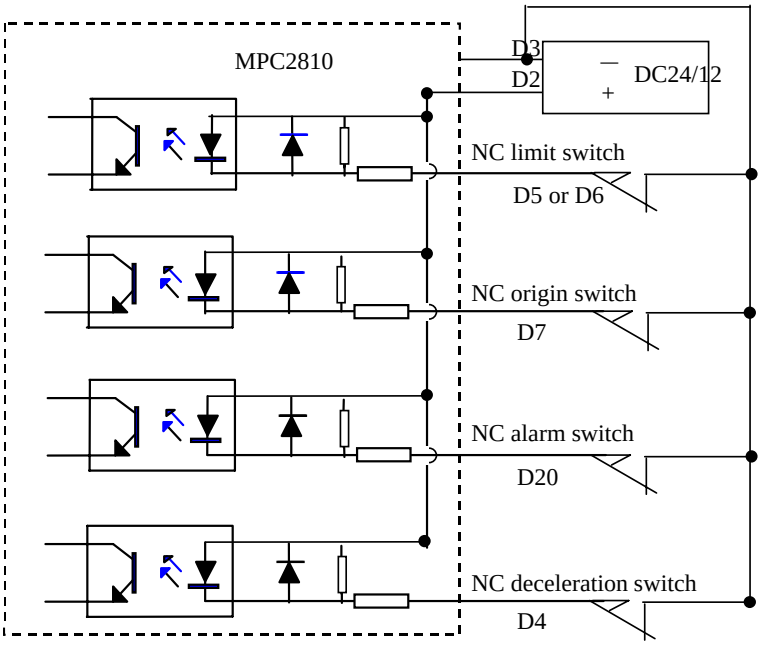
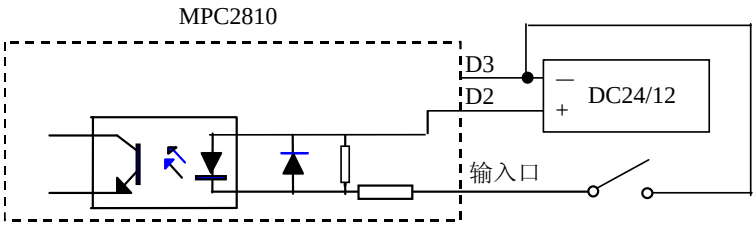


Fig.3-10 Special Inputs Connection Diagram

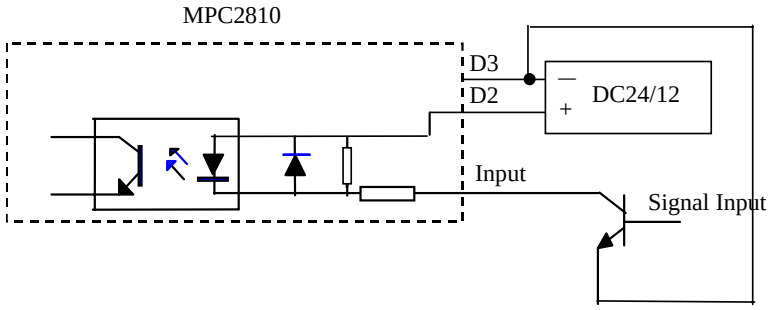
3.3.3.4 Connecting General I/O

1) General-purpose Inputs Loop



(a) Contact Switch

Fig.3-11 GI Connection Diagram

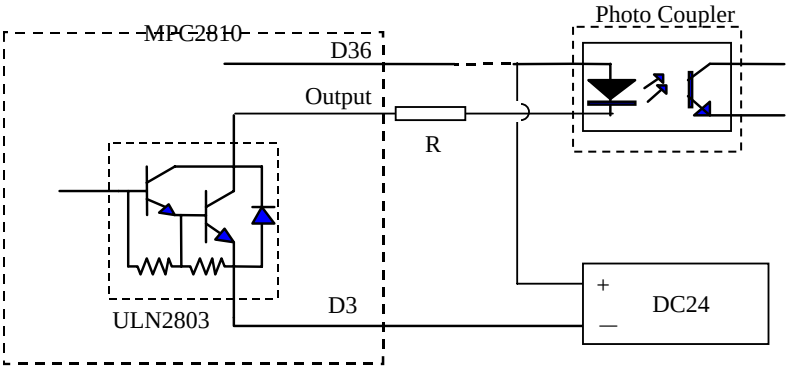


(b) NPN Switch

Fig.3-12 General Input Connection

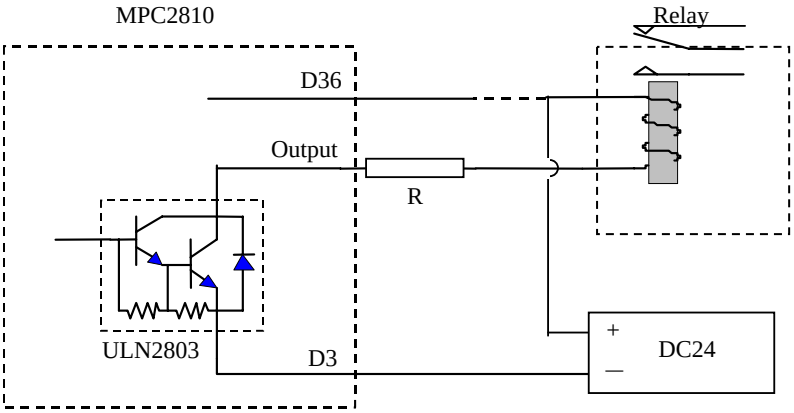
（2）General-purpose Output Loop

Open collector output of MPC2810 can be connected to relay, and photo coupler. The max output current is 500mA, voltage is 24V. It can be used as switch inputs of servo system (Servo-ON, Error Counter Reset) or be used for driving intermediate relay or photo coupler of 24DCV.



(a) Drive Photo Coupler

Fig.3-13 General Output Connection



(b) Drive Relay

Fig. 3-14 GO Connection Diagram

4 System Debugging

Debugging program can be found in the software CD. Before using the debugging software, please make sure the system hardware is set and connected well. Debugging software can be used to test if the system can work normally, confirm if the connection is all right, and realize some simple tracking motion.

When software installation completed, folder ***MPC2810*** will be automatically created (Default installation path: \ Program Files). The directory tree is as follows:

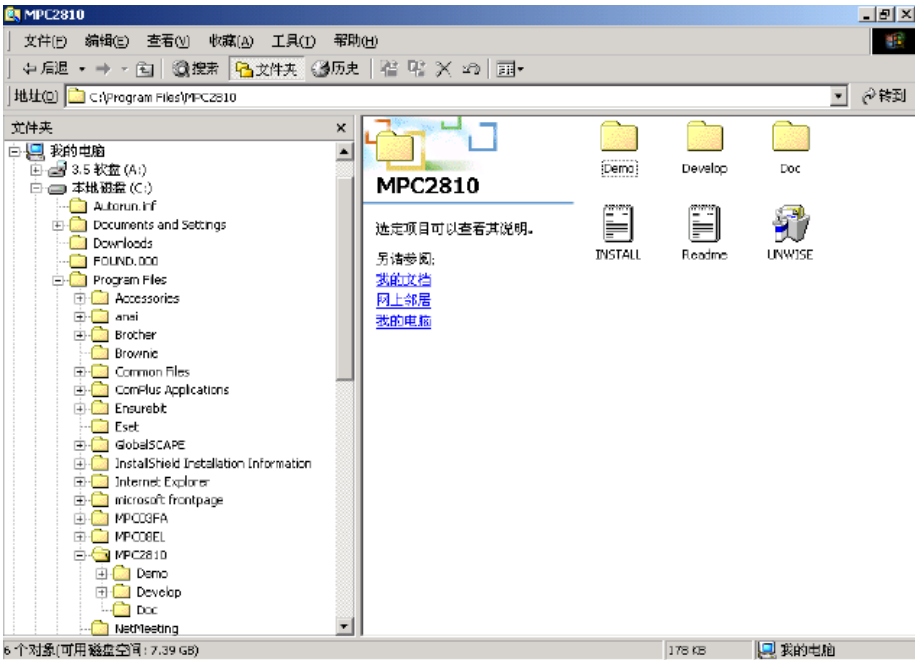


Fig.4-1 MPC2810 Directory Tree

Find **Demo3** the powerful debugging program following the path ***\Program Files\MPC2810\Demo\VCDemo\Demo3***. It is used for testing commands and I/Os of MPC2810. Modules are built in Demo3 to process G-code file and DXF file, simple trajectory motion can be generated with this program. Display

resolution: 1024*768 (Recommend).

How to use the debugging program?

The program operation window has two parts. Left-side in the window is the main frame composed of switch-over button, status display, counter-clear button, and homing button. Right-side in the window is the functionality module frame.

Switchover button is used to switchover among functionality modules. The first line of the status displays the current velocity (Unit: Pulses or mm)of the card, second line shows the value of current position (Unit: Pulses or mm), and the last line shows the feedback pulses. For MPC2810 can provide encoder feedback to only 2 axes, the feedback value of 3rd and 4th axes will be always zero. Counter-clear button is used for setting the current position as zero. Click the counter-clear button, the value in 2nd line of status will become zero without any axis motion. Homing button is used for homing motion of all 4 axes. Upon clicking this button, 4 axes will back to the origin.

（1） Commands Testing Module

Fig.4-2 shows the window of commands testing module. Commands testing module is used for testing all commands of MPC2810 except for auto_set and init_board (**auto_set, init_board should be called only once**). Click and select a command in the list to read the detailed introduction about the command, such as the command function, the required parameters for instructions and the command response. Then double click a command in the list to set related parameters in the pop-up dialogue box accordingly. Click **OK** to complete the settings. Click **Run** to execute the command. To stop or deceleration stop the motion, click corresponding button. Command “get_last_err” is used for

checking if any command error and response the error code. User can define the error source by checking the error code list.

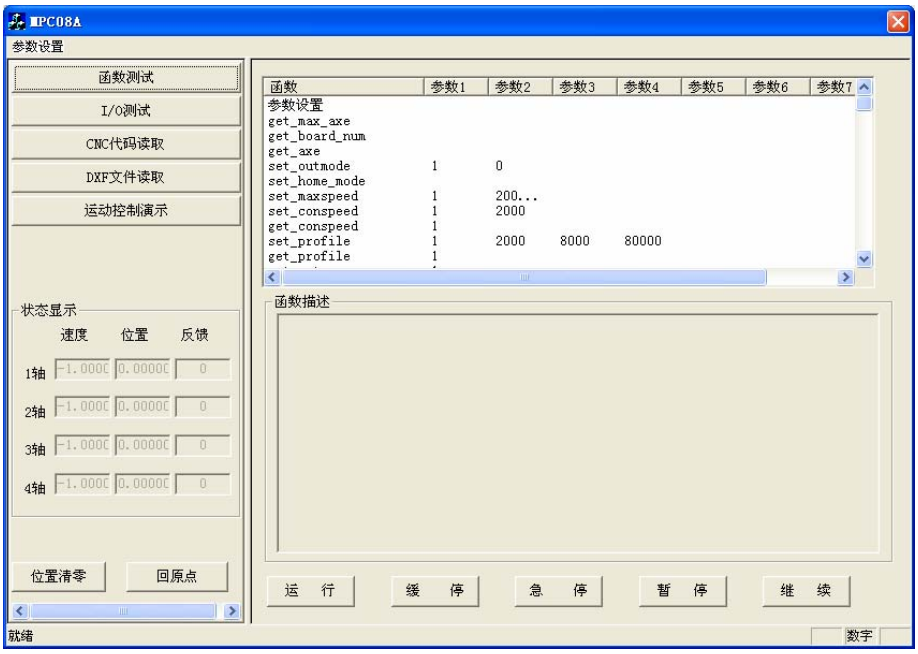


Fig. 4-2 MPC2810-Demo Operation Window

（2） IO Test Module

Fig.4-3 shows the window of I/O testing module. This module can be used for checking the I/O status. If the signal is high-voltage effective, the corresponding symbol is red. If the signal is low-voltage effective, the corresponding symbol is green. If any I/O error occurs, the corresponding symbol will be blue. To set the signal as general signal, leave the checkbox on the right-side of corresponding input signal symbol blank. Select High-voltage or Low-voltage option to set the axis signals high-voltage effective or low-voltage effective. Status of the 16-ch inputs from the extension board C4037 is shown on the right-side in the window (01-16). Refer to ***3.2.2 General I/O Extension Board-C4037***. The other three general inputs (18-20)

are from MPC2810 directly. The 24-ch general outputs symbols shown at the bottom in the window are used for setting the corresponding output high-voltage effective or low-voltage effective. Click corresponding signal symbol to set the signal status. If the signal is set as high-voltage effective, the corresponding symbol is red. If the signal is set as low-voltage effective, the corresponding symbol is green. **Note: After initialization, all axis signals will be high-voltage effective. But this program automatically initializes the axis signals as low- voltage effective.**

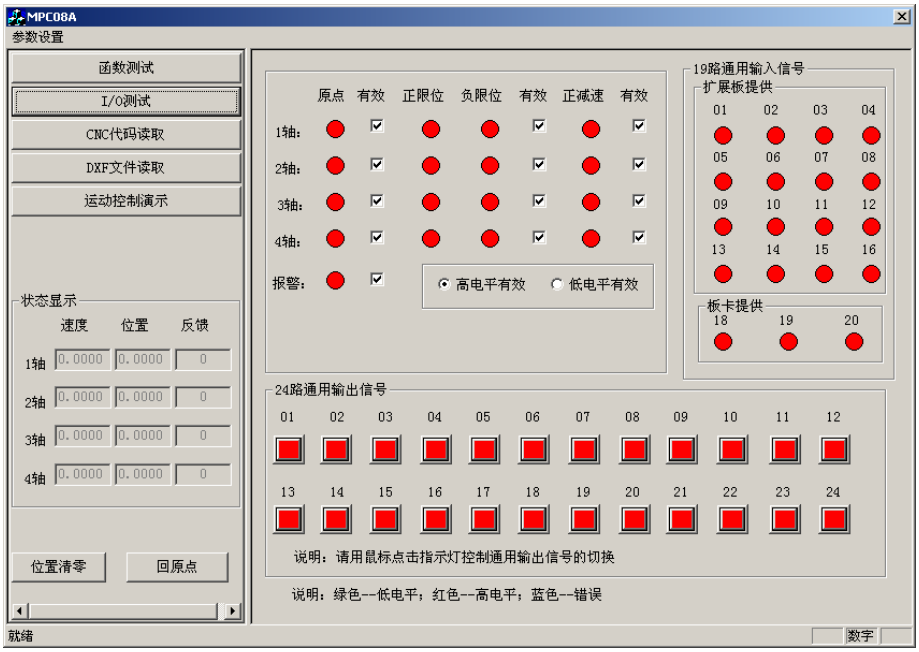


Fig. 4-3 I/O Test Operation Window

(3) CNC Reading Module

Fig.4-4 shows the CNC Reading Module Window. This program can be used to export the G-code file. In the window, user can see the file path shown at the top in the window, and the file content(G-code) shown on the left-side in the window. Click COMPILE to compile the G-code file. If any error occurred, error

cause will be indicated. If successful, the graph tracking will be shown on the right-side in the window. Type the initial velocity value of the axis to the Vector Speed blank, the max velocity of the axis to the Vector High Speed, and the acceleration velocity of the axis to the Vector Acceleration blank (Unit: mm/s). Click RUN to process the G-code file. Click corresponding button to pause or stop the process.

Note: Do not turn to another window when the program is running. If any disturbance, motion will stop.

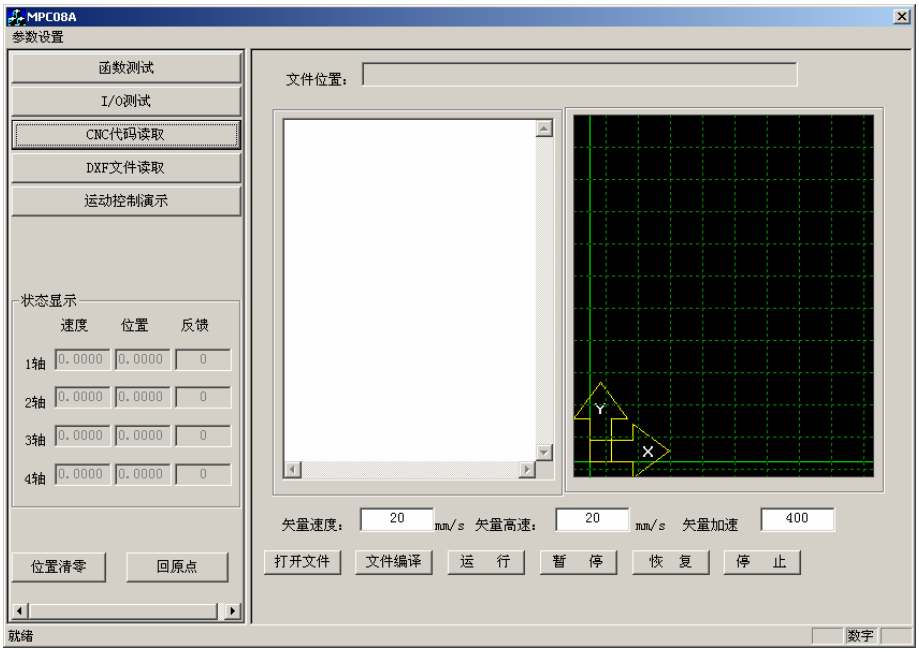


Fig. 4-4 CNC Reading Module Window

（4）DXF Reading Module

Fig.4-5 shows the DXF Reading Module Window. If the DXF-code file successfully exported, the graph tracking will be shown in the window. Type the initial velocity value of the axis to the Vector Speed blank, the max velocity of the axis to the Vector High Speed, and the acceleration velocity of the axis to the Vector Acceleration blank (Unit: mm/s). Click RUN to process the DXF file.

Click corresponding button to pause or stop the process.

Note:

1. Do not turn to another window when the program is running. If any disturbance, motion will stop.

2. This program can process only the rectilinear and circular closed graph (*.DXF). Do avoid multi lines share the same intersection point.

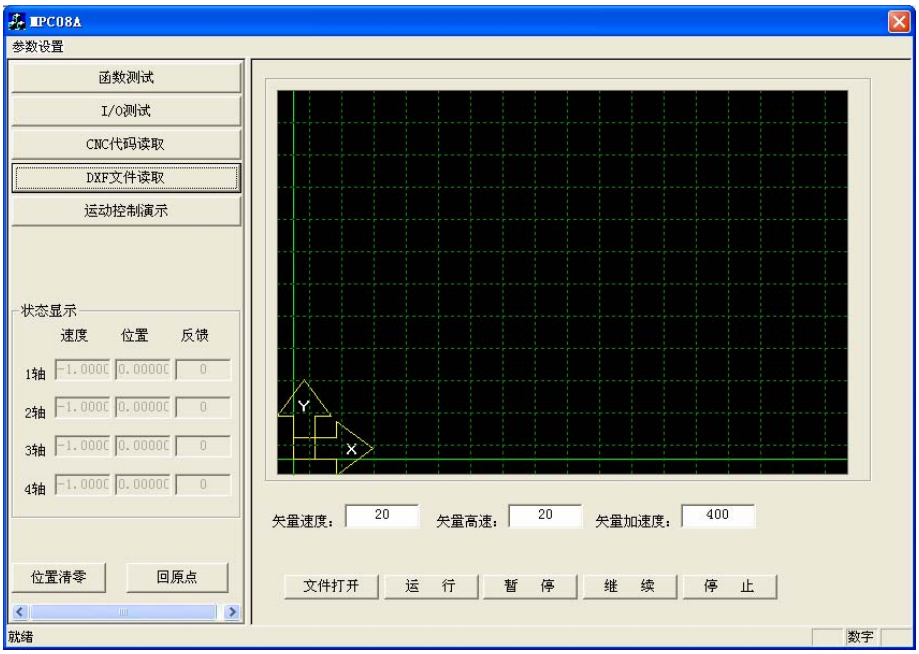


Fig 4-5 DXF Reading Module Window

（5）Motion Control Demonstration Module

This program module can be used to operate point-to-point motion, continuous motion, homing motion, rectilinear interpolation, and circle interpolation. Refer to Fig. 4-6.

Fig 4-6 Motion Control Demonstration Example

(6) Parameter Configuration Module

Parameter Configuration window will pop out when you click “Parameter Configuration”. In this window, the user can set parameters of pulse output mode and feedback. Refer to Fig. 4-7.

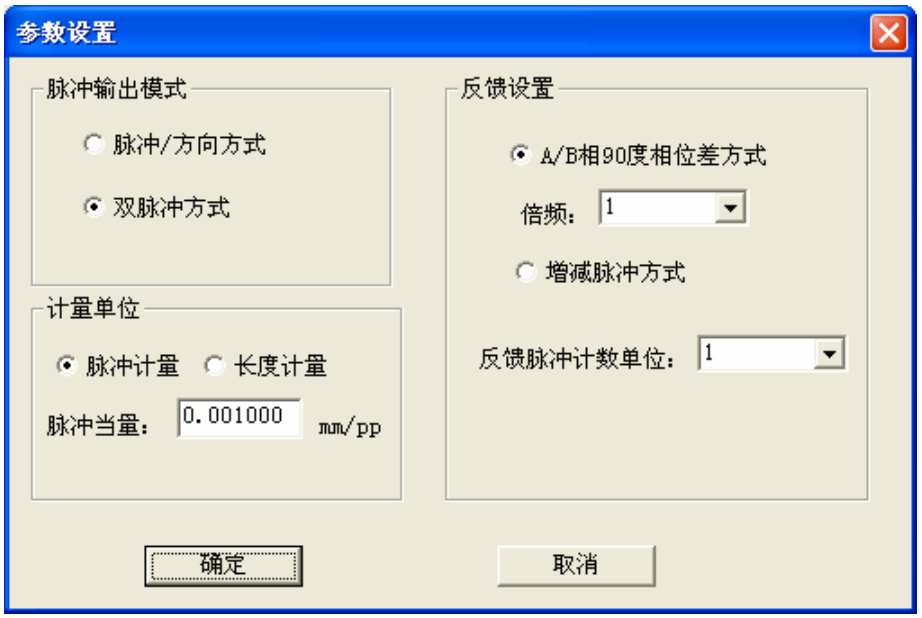
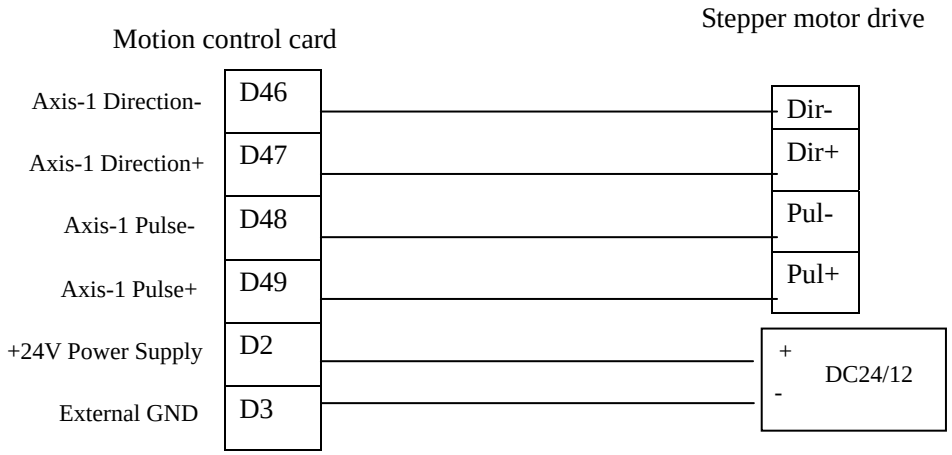


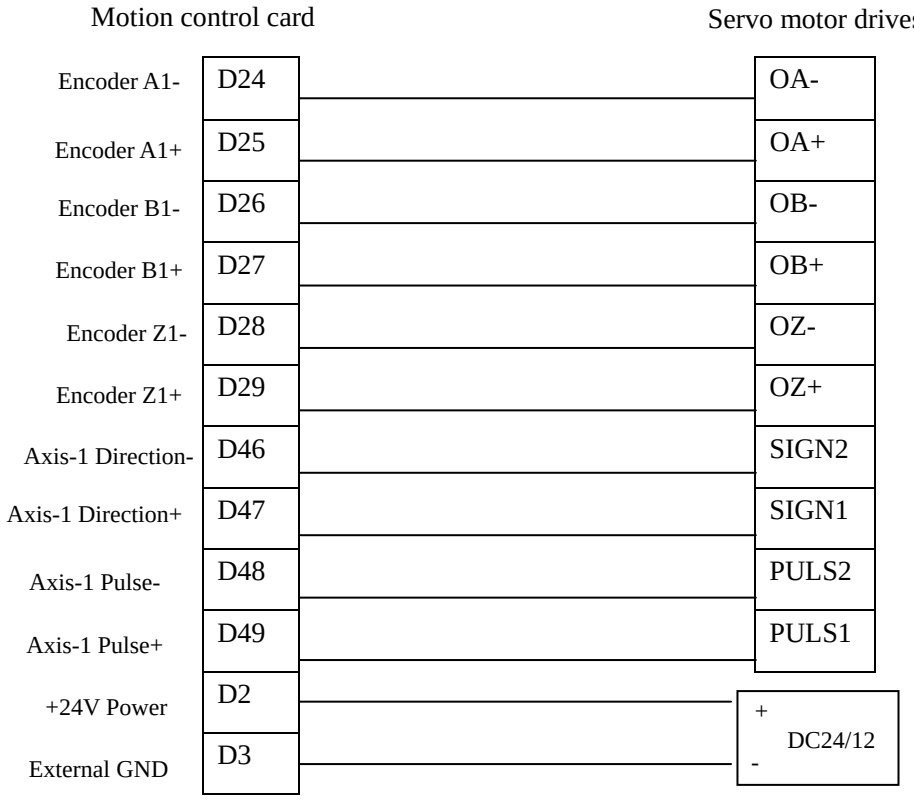
Fig 4-7 Parameter Configuration

5 Typical Connection

5.1 Connect MPC2810 To DMD808 Stepper Motor Drive



5.2 Connect MPC2810 To Panasonic MINAS A Series Servo Motor Drive



Note: The encoder feedback pins can be disconnected.