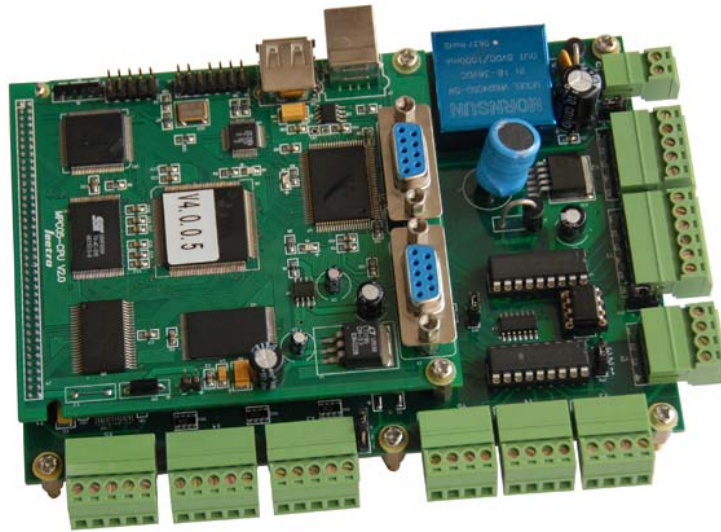


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**MANUFACTURER'S MANUAL**

# **MPC6575**

**Beta 1.0**



**Leetro Automation Co., Ltd.**

**Building 8-B**

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# Chapter 1 Preface

Thank you for using Leetro™ motion controllers. MPC6575, specially designed for close-loop laser engraving and cutting system.

This manual will instruct you on using MPC6575 in details.

Please read the instructions carefully before using MPC6575.

|   |  |
|---|--|
|    | <b>User should debug the system with full consideration on protection measures to avoid any machine damage or human injury</b> |
| <b>Warning</b>  |  |
|    | <b>Do not connect or use the Products without understanding this manual.</b>   |
| <b>Prohibited</b>   |  |
|  | <b>Do not disassemble, modify nor repair the Products without being authorized.</b>  |
| <b>Prohibited</b>   |  |
|  | <b>Do not subject the Product to water, corrosive or flammable gases, and combustibles.</b>                                    |
| <b>Prohibited</b>   |  |

# Chapter 2 Overview

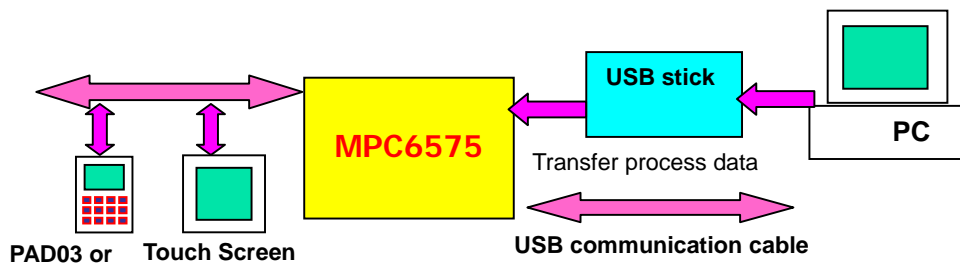
## 2.1 MPC6575 Introduction

The MPC6575 controller is a stand-alone close-loop control card specially designed for the servo control system of laser engraving and cutting machines. User can edit graphics, set parameters, and optimize path to develop a process file using computer. Copy the process file to USB stick, and load it to MPC6575 through the USB interface in the controller. Then Run the processing work with PAD03 control panel.

MPC6575 can be connected to the computer with a USB communication cable for the convenience of on-line debugging. The process file in the computer can also be directly loaded to the controller through the USB communication cable.

## 2.2 Control System Configuration

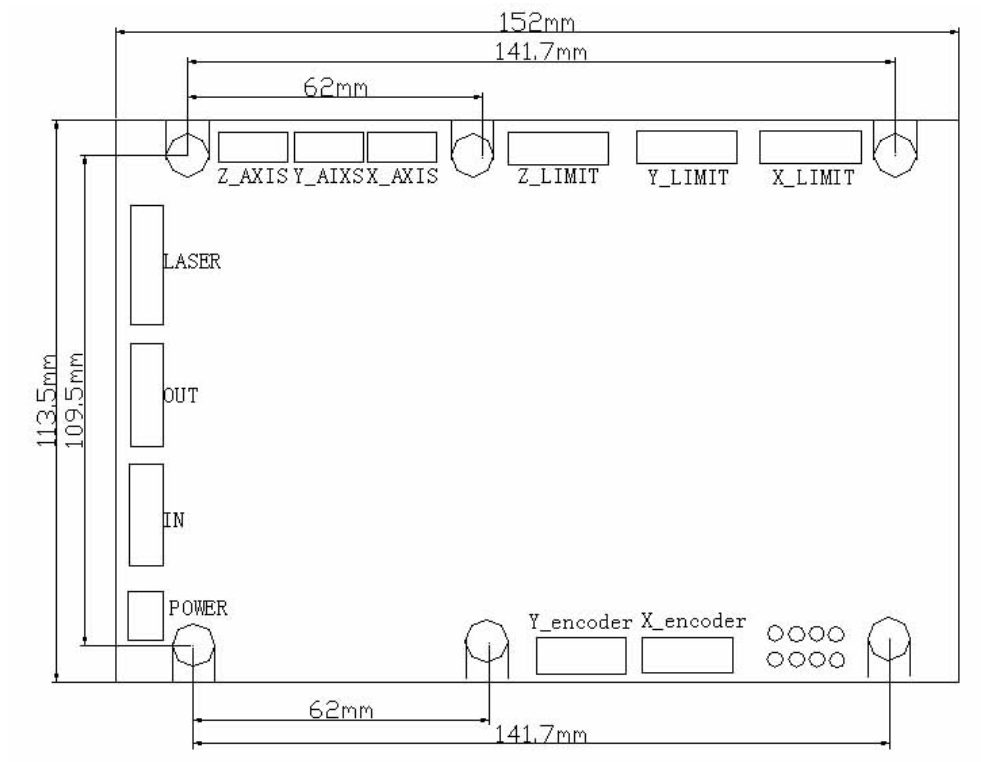
Refer to following diagram on MPC6575 close-loop motion control system:





# Chapter 3 Installation

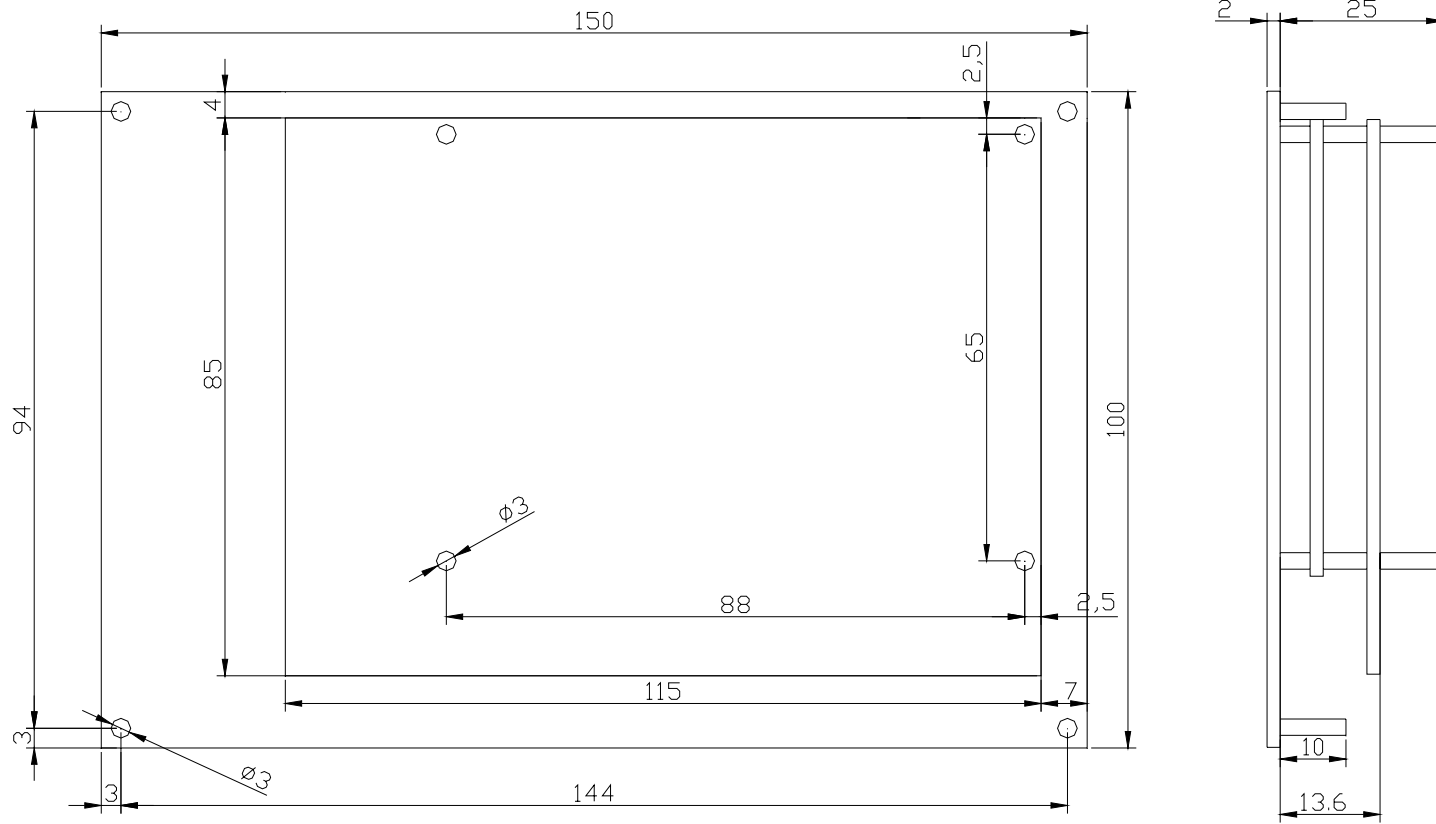
## 3.1 Main Board



The mainboard adopts six M3 bolts



### 3.2 PAD03





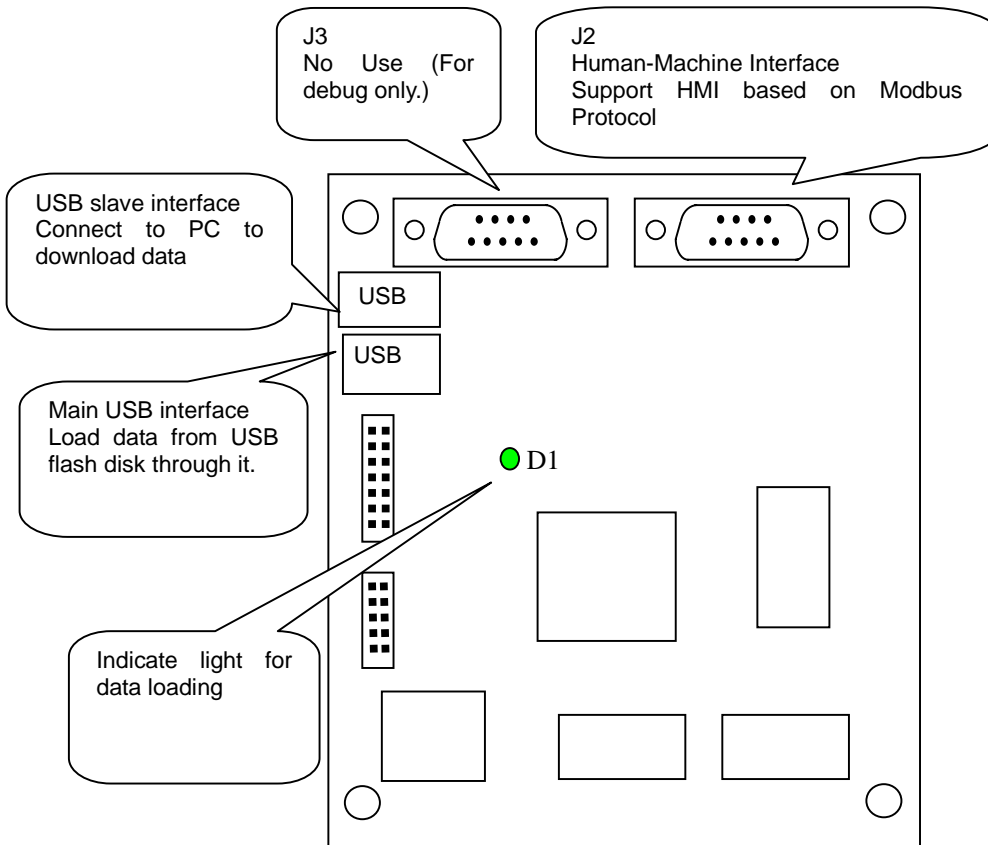
# Chapter 4 Hardware Interfaces

MPC6575 controller is composed of two parts:

- 1) MPC6575/MC motion control daughter board
- 2) MPC6575/CPU CPU mainboard

User can find corresponding mark on each board

## 4.1 MPC6575/CPU Interface

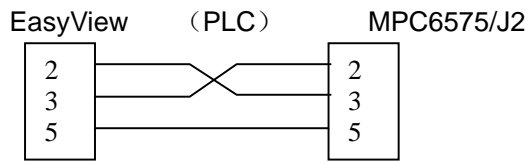


J2: HMI (RS232) -support HMIs such as EasyView, BYDseries HMI, PAD03, etc. based on Modbus Protocol

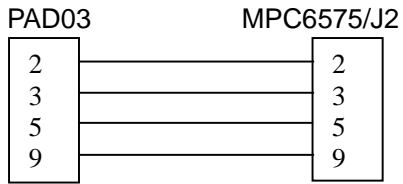
J2 adopts DB9-pin plug. Pin2, Pin3, Pin5 and Pin9 are used.

| Pins        | 1 | 2   | 3   | 4 | 5   | 6 | 7 | 8 | 9   |
|-------------|---|-----|-----|---|-----|---|---|---|-----|
| Description |   | TXD | RXD |   | GND |   |   |   | +5V |

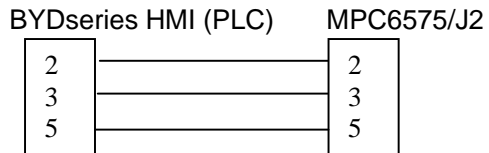
- Wiring of J2 and EasyView RS232 (PLC):



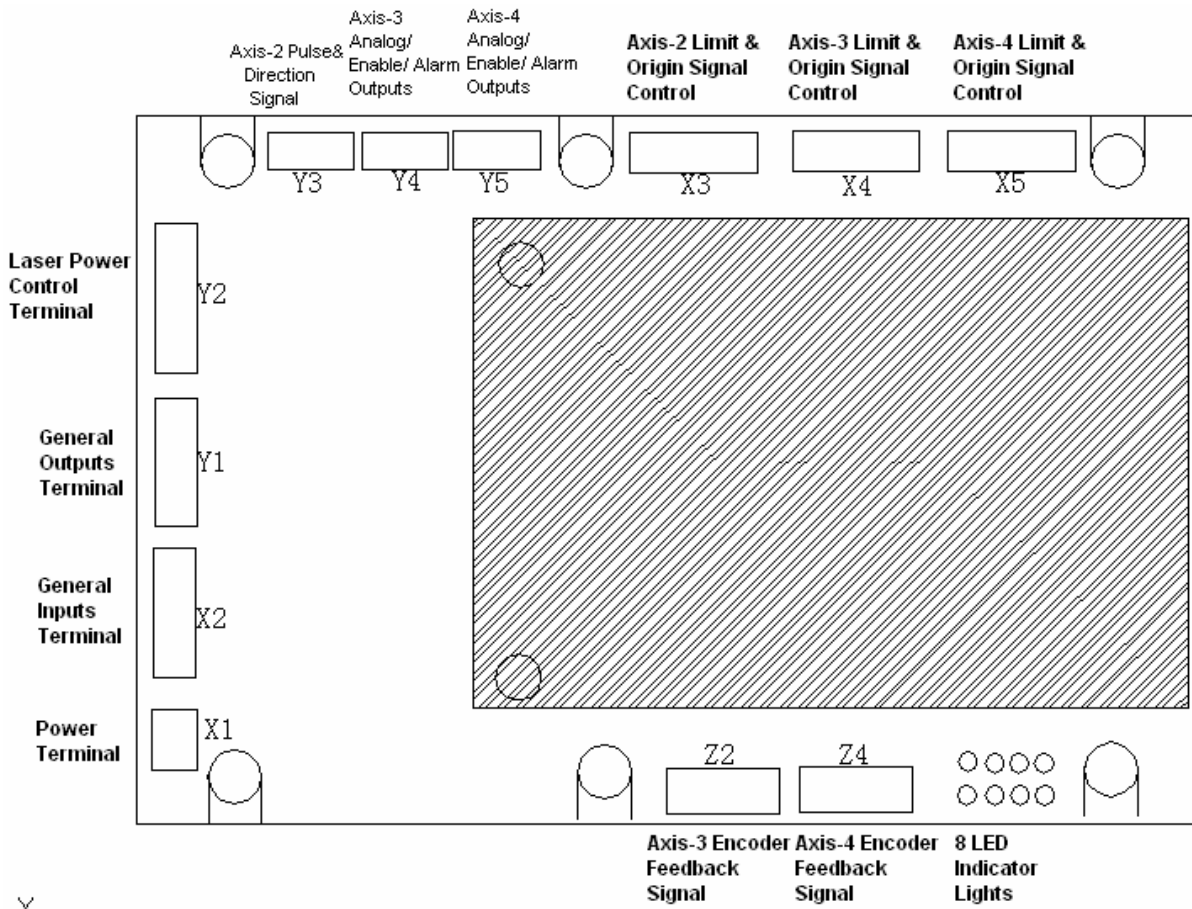
- Wiring of J2 and PAD03 RS232:



- Wiring of J2 and BYDseries HMI RS232 (PLC):



## 4.2 MPC6575/MC Interfaces



X

|                |   |
|----------------|---|
|                | <b>Please pay attention to the version of MPC6575/MC.<br/>MPC6575MCV1.1</b> |
| <b>Caution</b> |   |

### 4.2.1 Pin Array

Group 1: POWER (Input Power Pins)

|               |                   |
|---------------|-------------------|
| 1             | 2                 |
| +24<br>24VDC+ | GND<br>24V Ground |

Group 2: IN (Inputs Pins)

|                                |                                 |                                   |                         |     |       |
|--------------------------------|---------------------------------|-----------------------------------|-------------------------|-----|-------|
| 1                              | 2                               | 3                                 | 4                       | 5   | 6     |
| IN1<br>Foot<br>Pedal<br>Switch | INT2<br>Uncapping<br>protection | INT3<br>Speed-zero<br>clamp input | INT4<br>General input 4 | GND | 5/24V |

Group 3: OUT (Outputs Pins)

|                            |  |   |                             |                             |                                    |
|----------------------------|--|---|-----------------------------|-----------------------------|------------------------------------|
| 1                          | 2  | 3                                       | 4                           | 5                           | 6                                  |
| OUT1<br>Blow-off<br>On/Off | OUT2<br>Process<br>completion<br>indicator light | OUT3<br>USB stick<br>indicator<br>light | OUT4<br>General<br>output 3 | OUT5<br>General<br>output 4 | OUT6<br>Speed-zero clamp<br>output |

Group 4: LASER (Laser Control Signal Pins)

|     |                          |                           |      |      |                                       |  |
|-----|--------------------------|---------------------------|------|------|---------------------------------------|--|
| 1   | 2                        | 3                         | 4    | 5    | 6                                     | 7                                      |
| GND | DA1<br>Analog<br>Output1 | DA2<br>Analog<br>Output 2 | PWM+ | PWM- | STH+<br>Laser On/Off<br>Differential+ | STH-<br>Laser On/Off<br>Differential+- |

Group 5: Z-AXIS (Z-axis Step Motor Control Signal Pins)

|                       |                           |     |    |
|-----------------------|---------------------------|-----|----|
| 1                     | 2                         | 3   | 4  |
| Z_PUL<br>Z-axis pulse | Z_DIR<br>Z-axis direction | GND | 5V |

Group 6: Y-AXIS (Y-axis Servo Motor Control Signal Pins)

|                                  |                   |                                    |                                   |
|----------------------------------|-------------------|------------------------------------|-----------------------------------|
| 1                                | 2                 | 3                                  | 4                                 |
| Y_DAC<br>Y-axis analog<br>output | GND<br>Analog GND | Y_EN<br>Y-axis servo enable output | Y_ALM<br>Y-axis servo alarm input |

Group 7: X-AXIS (X-axis Servo Motor Control Signal Pins)

|                                  |                   |                                    |                                   |
|----------------------------------|-------------------|------------------------------------|-----------------------------------|
| 1                                | 2                 | 3                                  | 4                                 |
| X_DAC<br>X-axis analog<br>output | GND<br>Analog GND | X_EN<br>X-axis servo enable output | X_ALM<br>X-axis servo alarm input |

Group 8: Z-LIMIT (Z-axis Origin and Limit Signal Pins)

|       |       |       |     |     |
|-------|-------|-------|-----|-----|
| 1     | 2     | 3     | 4   | 5   |
| Z_EL+ | Z_EL- | Z_ORG | GND | 24V |

Group 9: Y-LIMIT (Y-axis Origin and Limit Signal Pins)

|       |       |       |     |     |
|-------|-------|-------|-----|-----|
| 1     | 2     | 3     | 4   | 5   |
| Y_EL+ | Y_EL- | Y_ORG | GND | 24V |

Group 10: X-LIMIT (X-axis Origin and Limit Signal Pins)

|       |       |       |     |     |
|-------|-------|-------|-----|-----|
| 1     | 2     | 3     | 4   | 5   |
| X_EL+ | X_EL- | X_ORG | GND | 24V |

Group 11: Y-ENCODER (Encoder feedback signal port for Y-axis)

|      |      |      |      |      |      |
|------|------|------|------|------|------|
| 1    | 2    | 3    | 4    | 5    | 6    |
| Y_A+ | Y_A- | Y_B+ | Y_B- | Y_Z+ | Y_Z- |


Group 12: X-ENCODER (Encoder feedback signal port for X-axis)


|      |      |      |      |      |      |
|------|------|------|------|------|------|
| 1    | 2    | 3    | 4    | 5    | 6    |
| X_A+ | X_A- | X_B+ | X_B- | X_Z+ | X_Z- |




POWER: Input Power Pin (24VDC)


Remark: MPC6575 adopts single 24VDC power. The other power pins are used for output power of the controller.


|   |   |
|---|---|
|  | <p><b>MPC6575 adopts single 24VDC. User must use proper and reliable power supply. Exorbitant voltage could result in damage of components, while low voltage could result in problem in operation.</b></p> |
| <p><b>Warning</b></p>   |   |

|   |   |
|---|---|
|  <p>JP1:</p> | <p><b>The output power of the above pins should be used only for the common-anode and common-cathode of control signals, and should not be used as the power supply for motor drives. Failure to observe this instruction could result in damage of the controller.</b></p> |
| <p><b>Prohibited</b></p>  |   |

Note: JP1 is related with IN and OUT. If 24V voltage is required for input signal ports IN, the jumper should connect Pin1 and Pin2. If 5V voltage is required, the jumper should connect Pin2 and Pin3. If the jumper is removed, OUT pin should be disconnected.

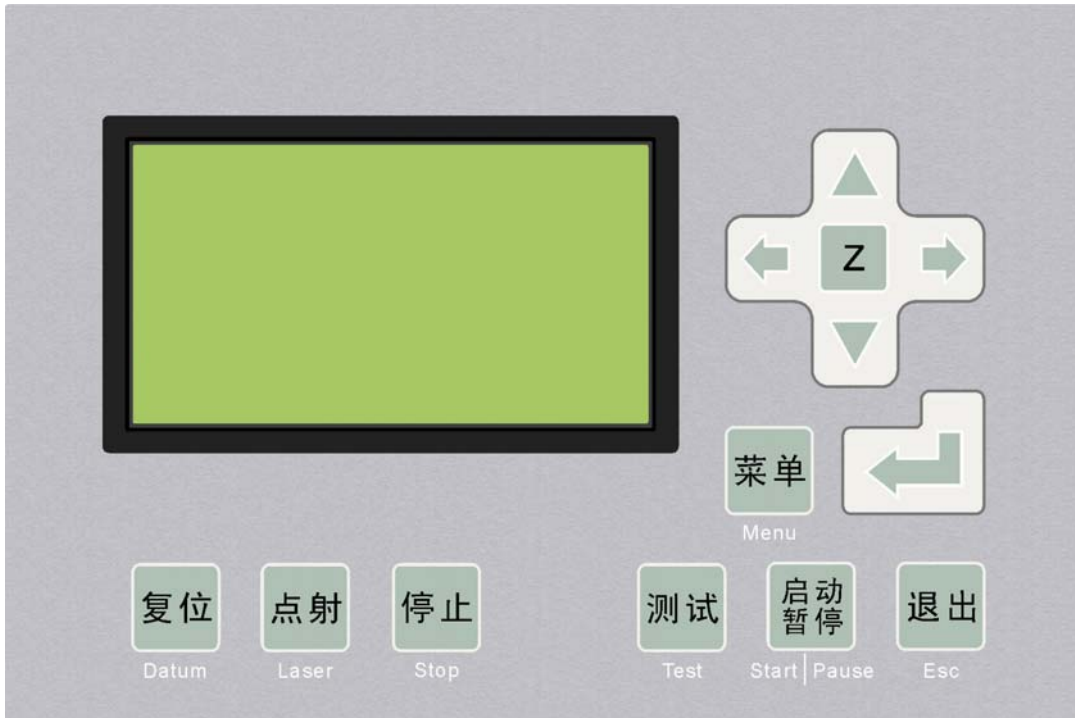
|  |   |
|--|---|
|  | <p><b>Do NOT connect the 5V and GND pins of Z_AXIS to external 5V power supply, for the two pins are the power outputs of MPC6575. The two pins can be used as the common-anode of stepper drive.</b></p> |
| <p><b>Warning</b></p>  |   |

|   |  |
|---|--|
|  | <p><b>All inputs and outputs are single-ended. Differential encoder feedbacks for X-axis and Y-axis.</b></p> |
| <p><b>Caution</b></p>   |  |

|   |  |
|---|--|
|  | <p><b>GND of laser power should be connected to the GND pin of LASER with common-ground.</b></p> |
| <p><b>Caution</b></p>   |  |

## Chapter 5 PAD03 Operation

### 5.1 PAD03 Panel



Datum: Laser head will move to the origin of the machine slowly.

Laser: Laser on/off.

Stop: Cease the processing operation.

Test: The laser head will run along the outline border of the processing data.

Start/Pause: Start/pause the processing operation.

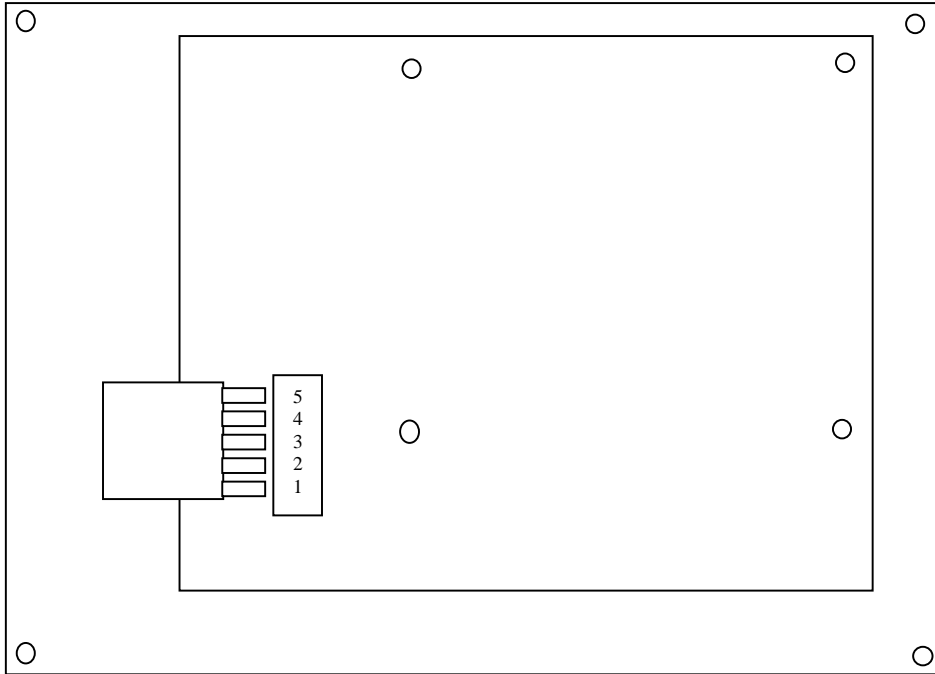
Esc: Exit current window.

Menu: Enter the menu list window to select the next option.

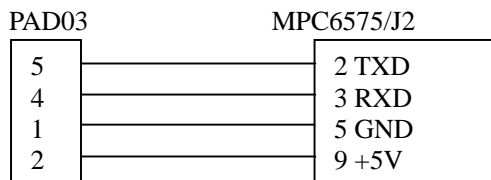
**Z**: Click this button, then  $\triangle$  and  $\nabla$  can move the Z axis. This function needs hardware (machine) support.

: Enter.

## 5.2 Connection



- Connect MPC6575/J2 to PAD03 RS232



## 5.3 Startup Message

When the power is on, following message will be displayed (V3.0.10 is the version number of PAD03):

|                                       |
|---------------------------------------|
| SYSTEM IS STARTING,<br>PLEASE WAIT... |
| V 3.0.10                              |

## 5.4 Main Interface

If there's no communication problem with MPC6575, main interface will be shown as follows:

|       |            |
|-------|------------|
| FILE  | AAA        |
| SPEED | 100%       |
| POWER | 100 / 100% |
| TIME  | 0 : 0 : 15 |



File: The saved file name loaded to MPC6575 controller.



Speed: Percentage of processing speed. When it is 100, the actual speed is the number which is set in processing data.


Power: Percentage of processing power. When it is 100, the actual power is the number which is set in processing data. There are two options such as the **Corner Power** and the **Power**.

Pieces: The value indicates how many pieces of the same work you want.





Del: Delete the file.


Press  or  to select the option you want to edit. Selected option will be highlighted.

Press  or  to set the value of selected option such as the processing speed value, the corner power, the standard power and pieces.

Press  to save the edited settings.

To exit the edit interface, press **Esc** till no option highlighted.

Having completed the settings, user can Press     to move the laser head.

Or press  to enter the edit interface again.

**Remark1:** Press  to complete the settings on speed, power and pieces.

*The completed settings will not be lost even the power is off.*

Press **ESC** till cursor disappears to continue the following steps.

To draw lines, hold down **Laser** button, and press    .

Press **Laser** to beam according to the settings of LASER SET.

Press **Datum** to have the X-axis and Y-axis make homing motion simultaneously;

DATUM...

X and Y axes will not stop until they reach the origin point or the user press **Stop** button.



Press **Test** to generate the contouring motion, and following text displays.

BORDERING  
PLEASE WAIT

When bordering finished, press  to return to the main interface.

Press **Z** button, text displays as follows:

Z-AXIS OPERATE

Press  or  to generate Z-axis jogging.

Press **Datume** to make Z-axis do homing motion.

Press **Stop** to stop the homing motion of Z-axis.

Press **Z** to return to the main interface.

Text displayed when Z-axis is homing.

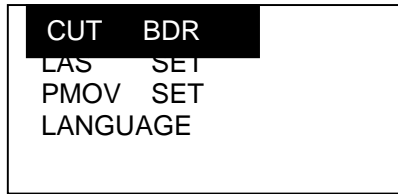
Z-AXIS DATUM

Z axis will not stop until it reaches the origin point or the user press **Stop** button.

## 5.5 Supporting Interface

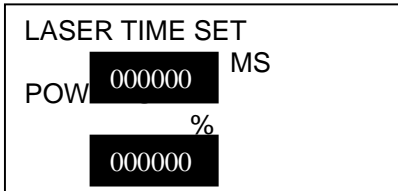
Press **Menu** to enter the supporting interface as follows.

---



CUT BDR: Laser head will move a rectangle with laser on according to the size of the graphics.

LAS SET: Select this option and press . The LAS SET interface is as follows.



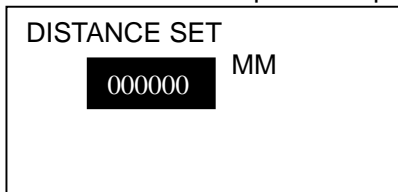
Press or can move the cursor.

Press or can change the number.

Press and all the number will be saved.

If the value is 0, press **Laser** and laser will be on; loosen the button and laser will be off.  
If the value is not 0, press **Laser** and laser will shoot a certain time as set by the user.

PMOV SET: Select this option and press . The PMOV SET interface is as follows.



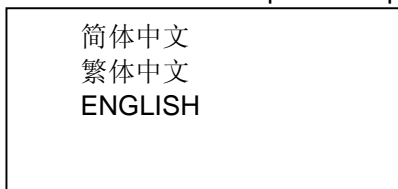
Press or to adjust the value.

Press to save the setting.

If this value is 0, press to move the laser head, and loosen the buttons to stop the laser head.

If this value is not 0, press to move the laser head a certain distance as set by the user.

LANGUAGE: Select this option and press . The language interface is as follows.



Select the language as you prefer.

## 5.6 Processing Interface

Press **Start** to enter the processing interface shown as follows..

|       |            |
|-------|------------|
| FILE  | AAA        |
| SPEED | 100%       |
| POWER | 100 / 100% |
| TIME  | 0 : 0 : 15 |



File: Name of the file which is to be processed.



Speed: Percentage of the processing speed.

Power: Percentage of the processing power.

Time: Time for processing this file.

When processing,

Press  and  to adjust the percentage of the processing power (only for Power, not for Corner -Power). Value should be from 0-100.

Press  and  to adjust the percentage of the processing speed. Value should be from 0-100.

Press **Start/Pause** to start or pause the processing.

Press **Stop** to cancel the processing. The user interface shows **Stopped**. Press **Esc** to back to the main user interface.

Press the button **Start/Pause** during the processing to shift between commands such as start and pause.

The pause interface is as follows:





|  |
|--|
| PAUSED<br>PRESS START/PAUSE TO<br>CONTINUE |
|--|

Once the pause interface as the above is entered, only **Start/Pause** and **Stop** buttons can be effective.

To back to the processing interface, press the button **Start/Pause** twice.




To cancel the processing, press **Stop** and following text displays.

|         |
|---------|
| STOPPED |
|---------|

Once the stop interface as the above is entered, only **Start/Pause**, **Esc**, and     buttons can be effective.

To enter the processing interface, press the button **Start/Pause**.

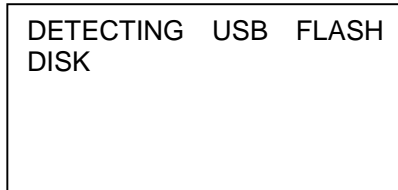
To return to the main interface to set parameters, press **Esc**.

Press     to generate jogging motion according to the set parameters.

Once the processing finished, only **Start/Pause**, and **Esc** buttons can be effective.  
To enter the processing interface, press **Start/Pause**.  
To return to the main interface, press **Esc**.

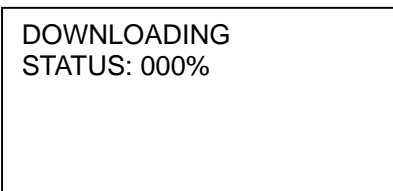
## 5.7 Download from USB Stick

Return to the main interface, plug the USB stick into the controller and the user interface of PAD03 will display as follows:



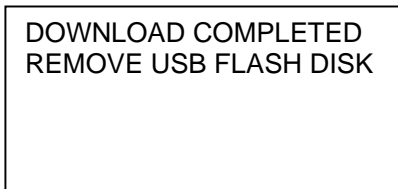
DETECTING USB FLASH  
DISK

Once the USB stick is detected without error, the controller starts downloading the processing file from the USB stick. User interface of PAD03 displays as follows:



DOWNLOADING  
STATUS: 000%

Once the downloading completed, the buzzer starts ringing, and the user interface displays as follows:



DOWNLOAD COMPLETED  
REMOVE USB FLASH DISK

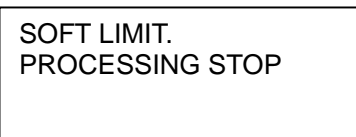
Once the USB stick is pulled out, the ringing ceases.

## 5.8 Error Alarm Interface

### 5.8.1 Introduction

If any error occurred during the operation, the user can read the error message with PAD03 directly.

### 5.8.2 Stop Caused by Soft Limit



SOFT LIMIT.  
PROCESSING STOP

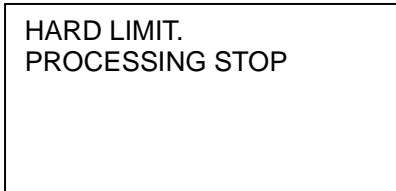


Software detects that the processing file goes beyond the worktable range.

**Solution:**

Adjust the position of the laser head till the whole processing file is within the worktable range.

### 5.8.3 Stop Caused by Hardware Limit



In the status that no Datum command is given and the machine is set as immediate processing mode, the above message will be shown for stop error caused by processing file going beyond the worktable range.

**Solution:**

Adjust the position of the laser head till the whole processing file is within the worktable range.

### 5.8.4 No Memory Space



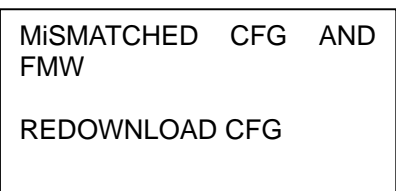
**Causes:**

1. The number of downloaded files exceeds 32.
2. Downloaded files are oversized. The file size exceeds 32M or 128M (MPC6515 Version above 4.1.1.0).

**Solution:**

Keep the file size less than the maximum memory space of MPC6515.  
Free the memory space of MPC6515 by deleting unneeded files.

### 5.8.5 Mismatched Configuration file and Firmware



**Causes:**

The config file hasn't been re-downloaded after upgrading the firmware.

**Solution:**

1. Open the destination directory of LASERCUT program and run the VerCheckTool.exe to check if the DLL version matches with the firmware version. If the DLL version and firmware

- version are mismatched, contact your supplier for correct one.
2. Run laserCut program, and re-download the configuration file.

#### 5.8.6 Mismatched DLL and Firmware

MISMATCHED DLL AND  
FMW

**Causes:**

The DLL with which the processing file was created is unmatched with the firmware version.

**Solution:**

1. Open the destination directory of LASERCUT program and run the VerCheckTool.exe to check if the DLL version matches with the firmware version. If the DLL version and firmware version are mismatched, contact your supplier for correct one.
2. Delete the processing file in MPC6515 and re-download the processing file matching with the firmware.

#### 5.8.7 Mismatched \*.HRD and \*.FMW

MISMATCHED HRD AND  
FMW  
REDOWNLOAD FMW

**Causes:**

The upgraded firmware is not supported by the current hardware.

**Solution:**

Re-upgrade the firmware as instructed in the manual. If the problem can't be solved yet, contact your supplier for support.

#### 5.8.8 Servo Out-of-Step Alarm

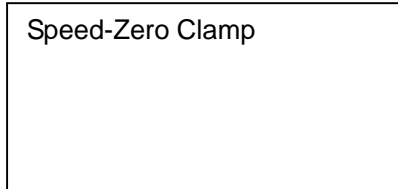
Servo Out of Step

**Causes:**

1. Feedback communication error on servo encoder
2. Settings of feedback pulse logic and voltage command logic are opposite.
3. Wrong wiring between the servo controller and the servo motor.
4. Servo motor is power-off.
5. Conflicting settings of servo motor drive parameters and controller parameters.


6. Value of over-voltage limit is set to be too small.
7. Servo motor drive is limited.

### 5.8.9 Speed-Zero Clamp



System is under speed-zero clamp:

1. Speed-zero clamp input is effective.

|   |  |
|---|--|
|  | <b>USB flash disk should be formatted to FAT16, if fail to follow this instruction, the flash disk cannot be detected by the controller.</b> |
| <b>Caution</b>  |  |

## Chapter 6 Touch Screen

### 6.1 Program & Download

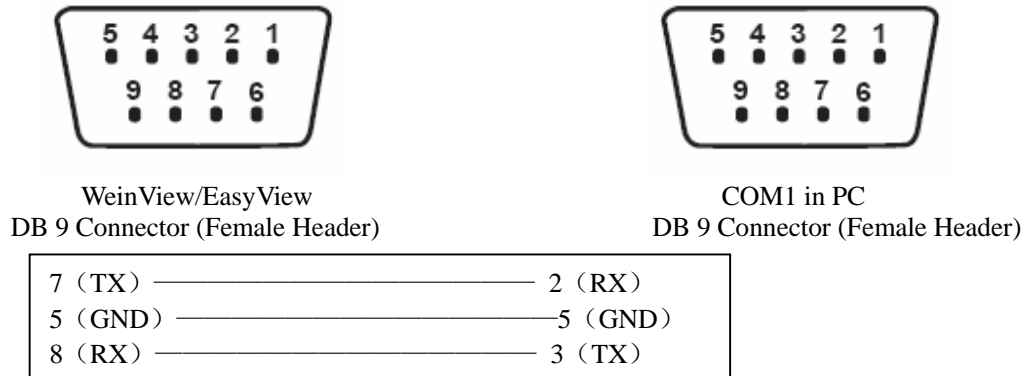
#### 6.1.1 Wiring

The touch screen adopts 24VDC power supply. One programming cable and one communication cable are needed for the touch screen.

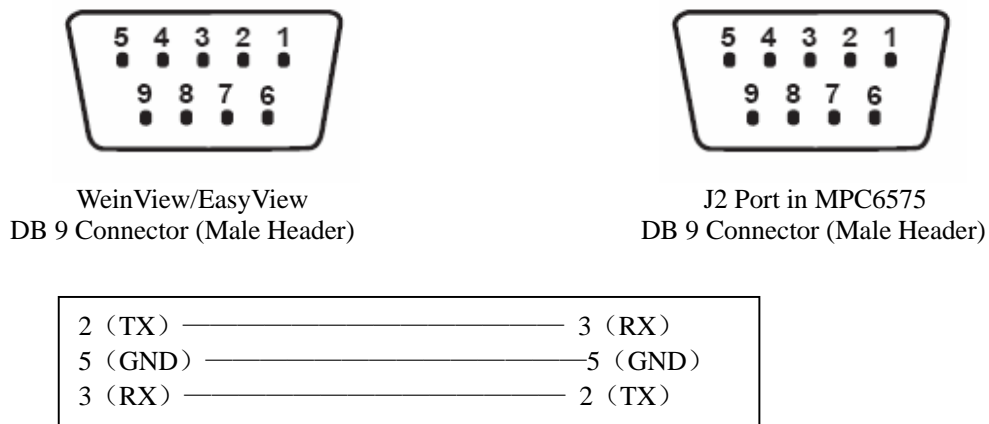
**Programming Cable:** Connect the touch screen to the serial interface of the PC. With this cable, user can download the edited interface program file from the PC to the touch screen.

**Communication Cable:** Connect the touch screen to the serial interface of MPC6575.

#### How to Make WeinView/EasyView Programming Cable

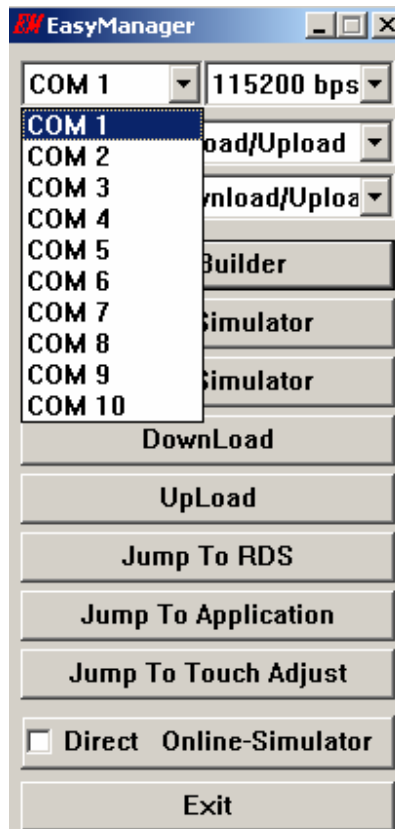


#### How to Make WeinView/EasyView Communication Cable



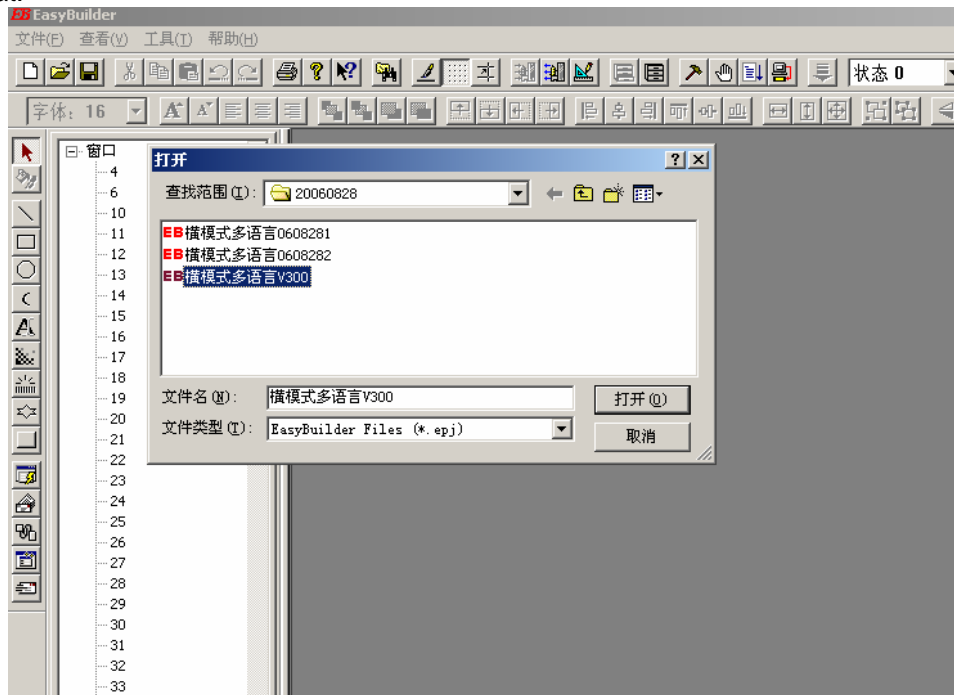
#### 6.1.2 Download Touch Screen Program

User should download the touch screen program with EasyBuilder software. Install and run EasyBuilder, and following window is to pop up:



Select the serial port (i.e. COM1) and enter the EasyBuilder edit window. The serial number of ports related with the practical wiring.

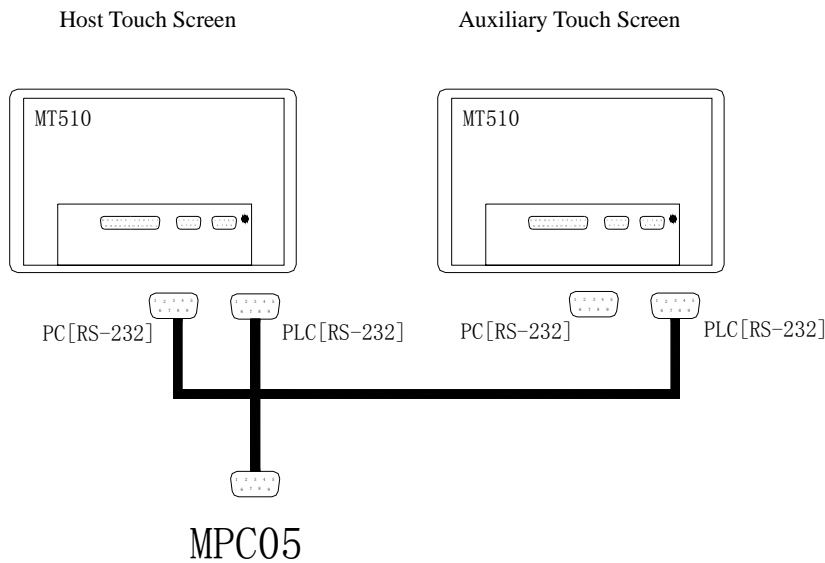
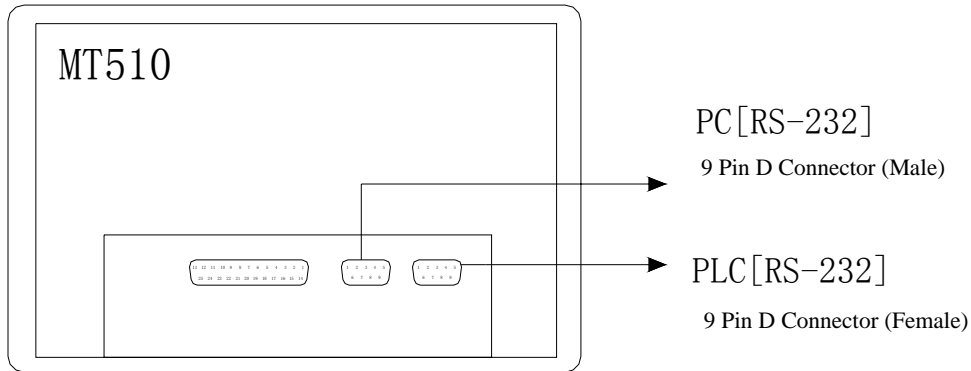
Click **Open** and following window pops up. Select and open the edited interface program file in \*.epj format:



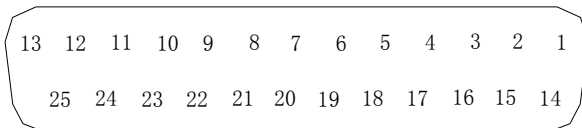
Select **Compile** in the toolbar to compile the program file. Then click **Download** to download the compiled file to the touch screen.

## 6.2 Connect to Two Touch Screens

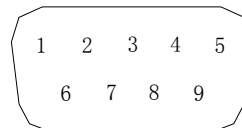
### 6.2.1 MT510 Wiring



DB connectors in the above figure are as follows:



DB25



DB9

**Connect Two Touch Screens:**

| Host Touch Screen<br>PLC[RS-232]9-pin Male<br>Header | Auxiliary Touch Screen<br>PLC[RS-232]9-pin Female<br>Header |
|--|---|
| 8 RD   | 2 TD  |
| 7 TD   | 3 RD  |
| 5 GND  | 5 GND   |

**Connect MPC6575 to Host Touch Screen:**

| MPC6575<br>[RS-232]9-pin Female<br>Header | Host Touch Screen<br>[RS-232]9-pin Female<br>Header |
|---|---|
| 2 TD                                      | 3 RD  |
| 3 RD                                      | 2 TD  |
| 5 GND                                     | 5 GND   |

## 6.3 Operation

### 6.3.1 Welcome Interface



### 6.3.2 Menu Interface

Randomly press on the touch screen to enter the following menu interface.

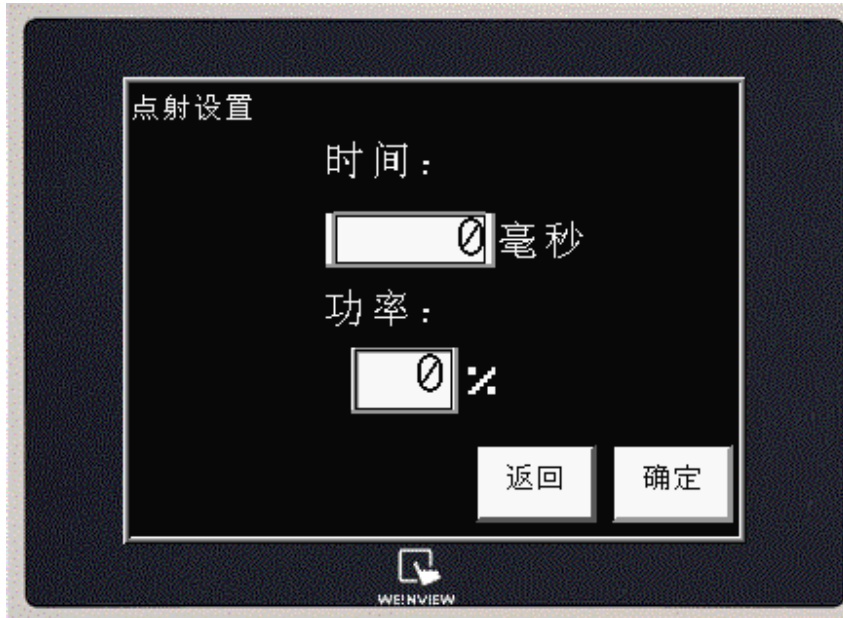


Three language options can be found in the menu interface such as Simplified Chinese (GB), Traditional Chinese (BIG5), and English.

The other three options are Laser Set, Jog Set and Main Interface.

### 6.3.3 Laser Interface

Press the Laser button in the menu interface to enter the Laser interface.



Laser time and power can be set in this interface. The default laser time is 0millisecond, and can be edited within the range of 0-99999ms. The default percentage of laser power is 100%., and can be edited within the range of 0-100%.

If the laser time is 0ms, user can hold down the Laser button to generate laser beam and loose the button to stop the laser beam. If the laser time is set to be 100ms, for example, each time the user press the Laser button the laser beam will be generated for 100ms.

Press Esc to return to the menu interface.



Press OK to enter the main interface.

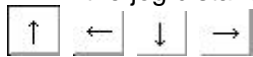
### 6.3.4 Jog Interface

Press the Jog Set button in the menu interface to enter the Jog Set interface.



Jog distance can be set in Jog Set interface.

If the jog distance is default 0.0mm (precision: 0.1mm), user can hold down the direction buttons



to move the laser, and loose the direction button to stop the laser. If the jog distance is set to be 100.0mm, for example, each time the user press the direction button the laser will move a distance of 100mm.

Press Esc to return to the menu interface.

Press OK to enter the main interface.

### 6.3.5 Main Interface

Press the Main Interface button in the menu interface can enter the main interface directly. User can also press OK in the Laser interface and Jog interface to enter the main interface.



#### Parameter Descriptions:





- File: Current file name. File name should not be longer than 8 letters or numbers.
- Sum: Total number of the files saved in the MPC6575.
- No.: Serial number of current file
- : Shift to the previous file.
- : Shift to the next file.
- Del: Delete current file.
- Speed: The percentage of the processing speed. This value can be adjusted within the range of 0-100%. The default value is 100%.
- Power: The percentage of the laser power. The first value indicates the laser power percentage at low speed. The second value indicates the laser power percentage at high speed. Both values can be adjusted within the range of 0-100%. The default value is 100%.
- Pcs: The number of workpieces to be processed. This value can be edited within the range of 1-999. The default value is 1.
- Laser: Laser shooting. All the shooting parameters are as set in the Laser interface.
- Datum: Laser return to the mechanical origin.
- : Jog upwards, downwards, leftwards, rightwards. Jog parameters are as set in the Jog interface.
- Z+: Move the Z axis towards positive direction.
- Z-: Move the Z axis towards negative direction.
- Cut: Cut border.
- Brd: Laser moves along the border with no laser beam generated.
- Esc: Return to the menu interface.
- OK: Enter the work interface.

#### 6.3.6 Work Interface

Press **OK** button in the main interface to shift to the work interface.



#### Parameter Descriptions:

- File: Current file name.
- Speed: Current percentage of the processing speed. The percentage of speed can be adjusted on-the-fly by pressing  and  buttons within the range of 0-100%.
- Power: Current percentage of processing power. The percentage of laser power at high-speed can be adjusted on-the-fly by pressing  and  buttons within the range of 0-100%.
- Pcs: The workpieces have already been processed.
- Status: Current work status. Touch screen will display the current status, i.e. Processing, Finished, or Pause according to the practical process status automatically.
- Time: Elapsed time of the processing.
- Start/Pause: Press this button to start the processing or to pause the processing on-the-fly. When the laser paused, press this button again to resume the work.
- Stop: Press this button to stop the processing and moves the laser back to the starting point of the process.
- Esc: Press Esc to return to the main interface.

#### 6.3.7 Status Interface

Once download signal of USB stick or datum signal is detected by MPC6575, Following message would pop up automatically.the user interface would shift to the USB stick download interface automatically.

- Datum signal detected: **Datum, please wait...** The message box will close automatically if datum motion stops.
- Download signal of USB stick detected: First the message **Detecting USB stick...** is to pop up. If the USB stick is detected without error, download status will be shown. When the download completed, message **Completed! Remove the USB Stick...** pops up. Once the USB stick is pulled out as commanded, message box would close automatically.

# Chapter 7 POP Text Display

## 7.1 Program & Download

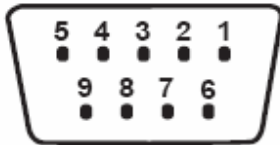
### 7.1.1 Wiring

The text display adopts 24VDC power supply. One programming cable and one communication cable are needed for the text display.

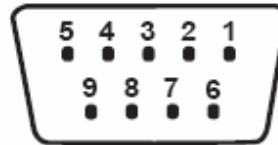
**Programming Cable:** Connect the text display to the serial interface of the PC. With this cable, user can download the edited interface program file from the PC to the text display.

**Communication Cable:** Connect the text display to the serial interface of MPC6575.

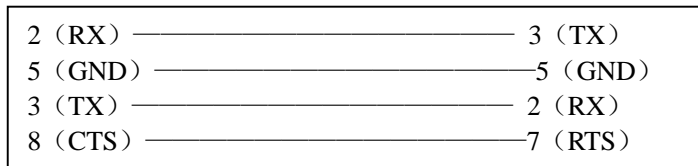
#### How to Make Text Display Programming Cable



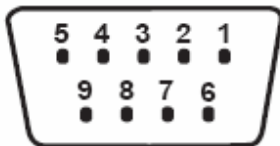
Text Display  
DB 9 Connector (Female Header)



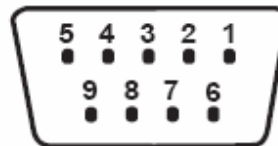
COM1 in PC  
DB 9 Connector (Female Header)



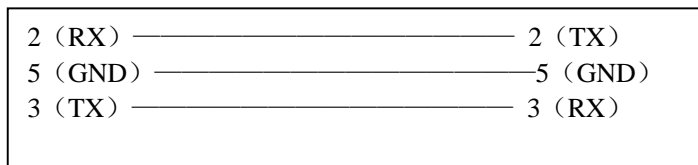
#### How to Make Text Display Communication Cable



Text Display  
DB 9 Connector (Female Header)



J2 port in MPC6515  
DB 9 Connector (Male Header)



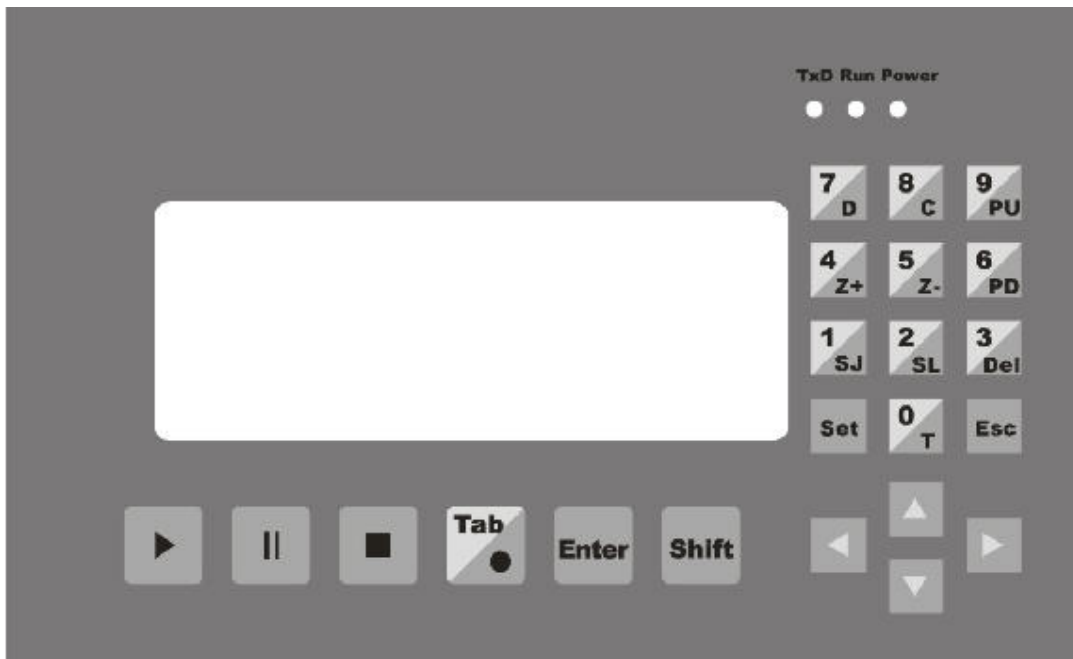
### 7.1.2 Download Text Display Program

Run JB\_HMI software (Provided by Text Display Supplier) to edit the text display. Click **Open** in the user interface, and select and open the edited text display program file (in \*.jb format).

Select **Download** in the toolbar.

Select corresponding download port and click **OK** to download the edited text display program file to the text display.

### 7.1.3 Panel of Text Display

















### 7.1.4 Main Interface

#### Introduction





- 1) File: Name of current file.
- 2) No.: Serial number of the file.
- 3) Speed: The percentage of the processing speed. This value can be adjusted within the range of 0-100%. The default value is 100%.
- 4) Sum: Total number of the files saved in the MPC6575.
- 5) Power: The percentage of the laser power. The first value indicates the laser power percentage at low speed. The second value indicates the laser power percentage at high speed. Both values can be adjusted within the range of 0-100%. The default value is 100%.
- 6) Pcs: The number of workpieces to be processed. This value can be edited within the range of 1-999. The default value is 1.
- 7) Finish: Current status of the laser machine. There are eleven kinds of work status, such as Finish, Bordering, Cut Bdr, Working, Pause, Datum, Jogging, Downloading, Download completed, Detect USB stick, and Remove USB stick, indicate the current work status.

Button Functions of the Panel (Cursor is nonactivated):


- 1) : Press this start button to shift to the processing interface.







- 2) : Press this button to activate the cursor.
- 3)    : The four buttons are used for controlling the movement of the laser. They correspond to Upwards, Downwards, Leftwards and Rightwards respectively.
- 4) : Press this button to shift to the jog set interface.
- 5) : Press this button to shift to the laser set interface.
- 6) : Press this button to delete the current file.
- 7) : Press this button to move the Z axis towards positive direction.
- 8) : Press this button to move the Z axis towards negative direction.
- 9) : Page Down.
- 10) : Press this datum button to move the laser return to origin point.
- 11) : Press the cut button to cut the border at 100% laser power.
- 12) : Page Up.
- 13) The other buttons are invalid.


Button Functions of the Panel (Cursor is activated):

- 1) : Press this button when cursor is activated, the cursor will move to the next option. There are four options such as speed, low-speed power, high-speed power and pieces. User can edit the option which is highlighted with the cursor by pressing the number buttons in the panel, and press  to save the edited values. To make the cursor disappear (nonactivated), press this tab button when the cursor moves to the option of pieces.
  - 2) : To confirm the edited settings.
  - 3) : Press Esc button to clear the selected value.
  - 4) The other buttons are invalid.
- All set parameters can be saved automatically if power's off.

### 7.1.5 Jog Set Interface

When cursor is nonactivated, press  to shift the interface from main interface to the Jog Set interface.


Then press  to edit the jog distance parameter, and press  to save the edited setting. If jog distance is set as default value 0mm, user can hold down one of the direction buttons     to move the laser and loose the direction button to stop the movement. If the jog distance is set to be 100mm, for example, each time the user press the direction button the laser will move a distance of 100mm.


Press  to return to the main interface.


The other buttons are invalid.



Precision of this parameter is 0.1mm. The set parameter can be saved automatically if power's off.


### 7.1.6 Laser Set Interface

When cursor is nonactivated, press  to shift the interface from main interface to the Laser Set interface.

Then press  to activate the cursor and set the laser time and power by the number


buttons, and press  to save the edited settings. The default laser time and power is 0millisecond and 100% respectively. The laser time can be edited within the range of 0-99999milliseconds, and the percentage of laser power can be edited within the range of 0-100%.










If the laser time is 0ms, user can hold down  button to generate laser beam and loose the  button to stop the laser. If the laser time is set to be 200ms, for example, each time the user press the  button the laser beam will be generated for 20ms.

Press  to return to the main interface.










The other buttons are invalid.






### 7.1.7 Work Interface

When cursor is nonactivated, press  to shift the interface from the main interface to the work interface. Following options will be displayed in the work interface:

- 1) File: Name of current file.
- 2) Speed: Current processing speed. The two buttons   can be used for editing the working speed. Press  to increase the speed, and press  to reduce the speed. Percentage of speed is within the range of 0-100%.
- 3) Power: Current processing power such as the low-speed laser power and the high-speed laser power. The two buttons   can be used for editing the high-speed laser power. Press  to reduce the high-speed laser power, and press  to increase the high-speed laser power. Percentage of power is within the range of 0-100%. The low-speed laser power value can not be edited in work interface. To edit the low-speed laser power, press  to return to the main interface first and do as instructed in **Chapter 7.1.4**.
- 4) Time: Process time.
- 5) Status: Indicate the current work status.

In work interface, button functions of the panel are stated as follows:


- 1)  : Press Esc button to return to the main interface.
- 2)  : Press this button to generate the bordering motion.
- 3)  : Press this button to start point shooting of laser. Laser time and power can be set in Laser Set interface.
- 4)  : Press this button to start the processing. During the processing,  button can also be used as pause/resume button .
- 5)  : Press this button to pause the processing. When the processing is paused, press  again to resume the work.
- 6)  : Press this button to stop the processing, and the laser head will move to the starting point of the processing.

Remark:  button is used for emergency stop. Press  button in high-speed movement will cause severe strick to the laser machine.  button is used for deceleration stop. It is suggested press  button first during processing. And press  to stop the processing when the work is paused.

### 7.1.8 USB Stick Download Interface

Once USB stick is detected plug in MPC6575, the user interface would shift to the USB stick download interface automatically.

In this interface the download status will be shown in the display. When 100% work is downloaded to the controller, the text display shows the message **Remove USB Stick**. When the USB stick is pulled out as commanded, the text display shows the message **Download Completed**.

Press  to return to the main interface.



## Chapter 8 Develop HMI

All HMIs support Modbus Protocol can be developed to the control panel of MPC6575. Take MT506LV45WV as an example:

### 8.1 Protocol and System Setting

Standard Modbus Protocol

PLC Type: Modbus RTU

Baud rate: 9600bps

Data bit: 8-bit;

Stop bit: 1-bit;

Verify: None.

### 8.2 Address

Address and functionality descriptions of PLC relay are as shown in following table:

| Components |             |               | Functionality                         | Type   | Rmark |
|------------|-------------|---------------|---------------------------------------|--------|-------|
| Address    | Device Type | Attributes    |                                       |        |       |
| 1          | 0x          | ON            | Start/Pause                           | Button |       |
| 2          | 0x          | ON/OFF shift  | Pause                                 | Button |       |
| 3          | 0x          | ON            | Datum                                 | Button |       |
| 4          | 0x          | ON            | Stop                                  | Button |       |
| 5          | 0x          | ON/OFF revert | Up                                    | Button |       |
| 6          | 0x          | ON/OFF revert | Down                                  | Button |       |
| 7          | 0x          | ON/OFF revert | Left                                  | Button |       |
| 8          | 0x          | ON/OFF revert | Right                                 | Button |       |
| 9~11       | 0x          |               | Reverse                               |        |       |
| 12         | 0x          | ON            | Z-axis Datum                          | Button |       |
| 13         | 0x          | ON            | XY axes Datum                         | Button |       |
| 14         | 0x          | ON            | Speed +1 during processing            | Button |       |
| 15         | 0x          | ON            | Speed -1 during processing            | Button |       |
| 16         | 0x          | ON            | High speed power +1 during processing | Button |       |
| 17         | 0x          | ON            | High speed power -1 during processing | Button |       |
| 18         | 0x          | ON            | Bordering                             | Button |       |
| 19         | 0x          | ON            | Cut Border                            | Button |       |
| 20         | 0x          | ON/OFF revert | Laser                                 | Button |       |
| 21         | 0x          | ON/OFF revert | Z-axis jog in positive direction      | Button |       |
| 22         | 0x          | ON/OFF revert | Z-axis jog in negative direction      | Button |       |
| 30         | 0x          | ON            | Delete the file                       | Button |       |
| 31         | 0x          | ON            | Shift to the next file                | Button |       |
| 32         | 0x          | ON            | Shift to the previous file            | Button |       |

- Addresses and functionalities of PLC register are as shown in following table:

| Address | Device Type | Data Type | Data length |      | Functionality                                      |                                    |
|---------|-------------|-----------|-------------|------|--|------------------------------------|
|         |             |           | bit         | byte |  |                                    |
| 1       | 4x          | BIN       | 16          | 1    | Percentage of processing speed (%)                 |                                    |
| 2       | 4x          | BIN       | 16          | 1    | Laser power corresponding to high speed            |                                    |
| 3       | 4x          | BIN       | 16          | 1    | Laser power corresponding to low speed             |                                    |
| 4       | 4x          | BIN       | 16          | 1    | Set the pieces to be processed                     |                                    |
| 5       | 4x          | BIN       | 16          | 1    | Reserve  |                                    |
| 6       | 4x          | BIN       | 16          | 1    | Completed pieces                                   |                                    |
| 7       | 4x          | BIN       | 16          | 1    | Reserve  |                                    |
| 8       | 4x          | BIN       | 32          | 2    | Shooting time:low<br>16 bit                        | Shooting time<br>unit: Millisecond |
| 9       |             |           |             |      | Shooting time:high<br>16 bit                       |                                    |
| 10      | 4x          | BIN       | 16          | 1    | Jogging distance                                   |                                    |
| 11      | 4x          | BIN       | 16          | 1    | Reserve  |                                    |
| 12      | 4x          | BIN       | 16          | 1    | Reserve  |                                    |
| 13      | 4x          | BIN       | 16          | 1    | Shooting time                                      |                                    |
| 14      | 4x          | BIN       | 16          | 1    | Shooting power                                     |                                    |
| 15      | 4x          | BIN       | 16          | 1    | Total number of files downloaded to the controller |                                    |
| 16      | 4x          | BIN       | 16          | 1    | Current File No.                                   |                                    |
| 17      | 4x          |           | 64          | 4    | File name (abcdefgh, 8 bytes shown in text mode)   |                                    |
| 21~28   | 4x          | BIN       | 16          | 1    | Reserve  |                                    |
| 29      | 4x          | BIN       | 16          | 1    | Processing time (h)                                |                                    |
| 30      | 4x          | BIN       | 16          | 1    | Processing time (m)                                |                                    |
| 31      | 4x          | BIN       | 16          | 1    | Processing time (s)                                |                                    |
| 32      | 4x          | BIN       | 16          | 1    | Working status                                     |                                    |
| 33      | 4x          | BIN       | 16          | 1    | Download progress (with USB stick) (%)             |                                    |

Refer to the following descriptions on each bit (Address: 32):

| F  | E   | D                          | C                   | B                            | A   | 9                          | 8                             |
|--|---|----------------------------|---------------------|------------------------------|---|----------------------------|-------------------------------|
|  |   |                            |                     |                              | 1: Speed-zero clamp<br>0: Cancel speed-zero clamp | 1: In pausing<br>0: Paused | 1: In jogging<br>0: Jog stops |
| 7  | 6   | 5                          | 4                   | 3                            | 2   | 1                          | 0                             |
| 1: Start download<br>0: Download completed | 1: plug in the USB stick<br>0: pull out the USB stick | 1: Z-axis datum<br>0: Stop | 1: Datum<br>0: Stop | 1: Cut Border<br>0: Finished | 1: Bordering<br>0: Finished                       | 1: Start<br>0: Stop        | 1: Pause<br>0: Resume         |

Status Code

- 0x0002: is processing
- 0x0003: processing is paused
- 0x0004: bordering
- 0x0008: cut border
- 0x0010: XY axes is homing (Datum)
- 0x0020: Z axis is homing (Datum)
- 0x0040: USB stick is detected
- 0x00c0: is downloading data from USB stick
- 0x0080: download completes, USB stick can be removed
- 0x0100: jogging

Remark: Each value of the status register indicates a special status.

### 8.3 Demo


Demonstration programs used for HMIs such as MT506LV45WV and BYD037L can be found in the software kit. User can refer to the demonstration programs to develop HMIs.


## Chapter 9 Download Data

For user's convenience, the firmware upgrading file, processing file and configuration file can be downloaded easily with a USB stick.

### 9.1 Upgrade Firmware


- (1) Copy the upgrade firmware data (6575600.FMW and 6575600.HDW) to the root directory of the USB stick (FAT16 format. Recommendation: do not save other files to the USB stick).
- (2) Plug the USB stick into the USB interface of MPC6575.
- (3) Electrify MPC6575, and the indicator light D1 in MPC6515/CPU will flash twice swiftly.
- (4) D1 keeps shining for 2-5 seconds (depend on the size of firmware upgrade file), which indicates the controller is upgrading the firmware. User can also tell the upgrading status through the indicator light in the USB stick.
- (5) When the firmware is upgraded successfully, D1 flashes swiftly. User can also tell if the upgrading finished through the indicator light in the USB stick.
- (6) Then remove the USB stick, and DSP firmware program will be started.
- (7) If MPC6575 fails to work after the USB stick being removed, probably something is wrong during the upgrade process. Please repeat the above upgrade steps.
- (8) If MPC6575 can't work yet after repeating the above steps, contact your supplier.


|   |   |
|---|---|
|  | <b>User can upgrade the firmware only when new version has been issued.</b> |
| <b>Notice</b>   |   |


|   |  |
|---|--|
|  | <b>To observe the upgrading process, it's recommended to use a USB stick with indicator light.</b> |
| <b>Notice</b>   |  |

## 9.2 Download Data

- (1) Copy the files in \*.mol format created with LaserCut software to the root directory of the USB stick (FAT16 format).
- (2) Electrify the MPC6575
- (3) Plug the USB stick into the MPC6575.
- (4) If the indicator light D1 in the MPC6575/CPU keeps shining for seconds or minutes (depend on the file size), the controller is downloading processing file.
- (5) If D1 flashes swiftly, download finished;
- (6) Remove the USB stick, select and run the processing file with the control panel.

|   |  |
|---|--|
|  | <b>Downloaded configuration file can only be effective after having been selected and run. Downloaded processing file can be started directly.</b> |
| <b>Notice</b>   |  |

|   |  |
|---|--|
|  | <b>If you use MPC6515 for the first time, please create the config file according to the machine's parameters, and then download and run the config file. Same operation should be followed each time the parameter changes.</b> |
| <b>Notice</b>   |  |

|   |  |
|---|--|
|  | <b>To observe the downloading process, it's recommended to use a USB stick with indicator light. The user can also lead the external USB indicator light signal to the panel of machine, and use LED to show the working status of the USB stick (Refer to Chapter 4). Human-machine interface will also display the downloading status.</b> |
| <b>Notice</b>   |  |

# Chapter 10 Work Status Indicator Lights

## 10.1 Indicate Error Code

### 10.1.1 Work Status Indicator Light

Working status of MPC6575 is indicated through the 8 LED indicator lights in MC card and 4 indicator lights in CPU card. Please refer to Chapter 4 to learn the position of the indicator lights.

Indicator lights in CPU card:

D1: indicate the working status of USB slave interface. It's normally flash green quickly;

D2: indicate the working status of USB slave interface. It's normally flash green slowly;

D3: indicate the operating status. It keeps shining green when processing graphics or downloading data from USB stick, and stops shining when the processing or downloading is stopped.

D4: No use

Indicator lights in MC card:

D1: When MPC6575 is powered on and started, D1 keeps shining;

D2: indicate pulse output status of Z axis. D2 keeps shining when Z axis is outputting pulses, and stops shining when outputting stopped.

D3: indicate pulse output status of Y axis. D3 keeps shining when Y axis is outputting pulses, and stops shining when outputting stopped.

D4: indicate pulse output status of X axis. D4 keeps shining when X axis is outputting pulses, and stops shining when outputting stopped.

D8: When the CPU mainloop of CPU card works normally, D8 flashes.



D7: When PAD03 is communicating with the MPC6575, D7 flashes.

### 10.1.2 Error Code Description






If there's any system error, D1 to D8 indicator lights in MC card will indicate the error code as following coding rules:

D1 to D8 indicate an 8-bit status and form 1-byte, i.e.: when D8, D7 and D6 keep shining, and the other indicator lights are off, the corresponding error code is 0xe0; when D1 to D4 are off, D5 to D8 are shining, the corresponding error code is 0xf0.





ON/OFF status indicated by following symbols:


-  Indicates the light is shining
-  Indicates the light is off

Error codes descriptions are as follows:

| Error Code | Lights Status(Left to right: D8 to D1)  | Causes  | Solution  |
|------------|---|---|---|
| 0xe0       |    | Mismatched process file (config file) and firmware version.<br>This error is possibly caused by forgetting to re-download the config file after the firmware upgrading. | Replace the function library with the correct one matching with the firmware version, and re-translate and re-download the processing file and config file.   |
| 0xe1       |  | Mismatched firmware and controller, i.e., the firmware of MPC05GA is used for MPC6515 by mistake.   | Apply the controller matching with the firmware   |
| 0xd0       |  | Oversized downloading data exceeds the rest memory size of MPC6575  | Delete the unneeded files in the controller memory, and re-download the processing file.  |
| 0xd2       |  | Downloading error. It is possibly the data transmitting error.  | Re-download data.   |
| 0xd3       |  | Data frame transmitted through the serial port is too long. It causes the communication error between PAD03 and MPC6575.  | 1. Restart MPC6575.<br>2. If the error can't be eliminated by following the 1 <sup>st</sup> step, replace the PAD03.<br>3. If the error can't be eliminated by following the 2 <sup>nd</sup> step, return the |



|      |   |   |  |
|------|---|---|--|
|      |   |   | controller to the supplier for repair  |
| 0xdf |    | Overtime slave USB interface communication.   | <ol style="list-style-type: none"> <li>1. Replace the USB communication cable if this error occurred frequently.</li> <li>2. Try on another PC if the error can't be eliminated by following the 1<sup>st</sup> step</li> <li>3. Return the controller to the supplier for repair if the error can't be eliminated by following the 2<sup>nd</sup> step</li> </ol> |
| 0xf1 |  | Config file error. It is possibly caused by forgetting to download the cfg file, or the cfg file doesn't match with the firmware. | Re-download correct configuration file<br>D8<br>D1   |
| 0xf2 |  | Mismatched firmware file (*.fmw) and hardware file (*.hdw)  | Re-download matching fmw file and hdw file.  |
| 0x55 |  | Speed-zero clamp signal is effective.   | Keep speed-zero clamp input (IN3) on.  |
| 0xff |  | Servo out-of-step alarm   | Examine the wiring of servo motor drive and controller to make all connections right and then restart the drive.   |

|   |   |
|---|---|
|  | <b>Please restart MPC6575 if any error occurred to resume to the normal status. Then solve the problem according to the above error codes descriptions.</b> |
| <b>Caution</b>  |   |



## Chapter 11 FAQ

### 11.1 USB Stick Indicator Light

#### 11.1.1 Functionality

MPC6575 is installed inside a machine, so that the user can't see the indicator lights in the controller. With a USB stick, the user can download the processing data to MPC6575 easily and observe the download status easily with an LED by leading out the indicator light of USB stick to the control panel of the machine. PAD03 will also display the status during the download progress.

#### 11.1.2 Instruction

Pin OUT3 (USB stick indicator light signal) in MPC6575/MCV1.1 board can be used for driving relay or LED to show the download status.

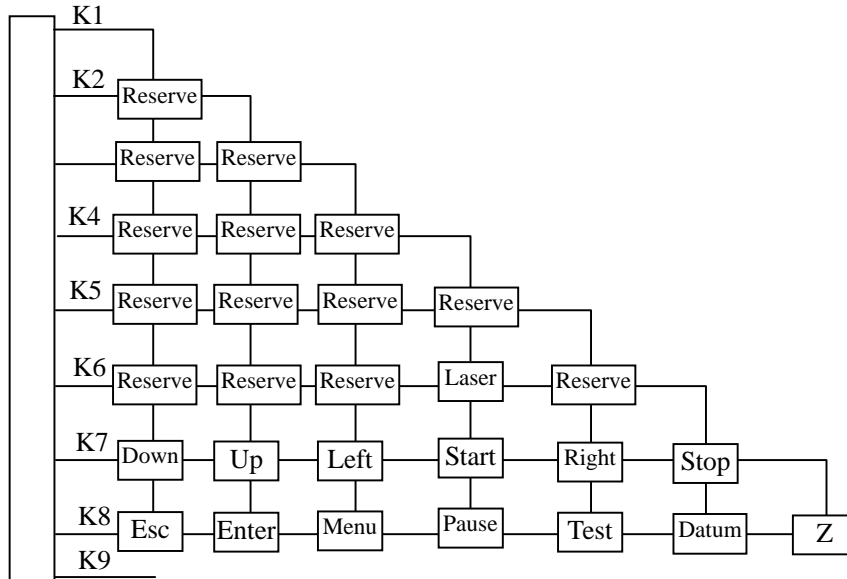
### 11.2 Customize PAD03 Control Panel

#### 11.2.1 Functionality

PAD03 is composed of control panel, LCD and main board. Standard PAD03 control panel is as described in Chapter 5. If the user wants to customize the panel, please refer to the following interface description figure.

#### 11.2.2 Instruction

The control panel is connected to the main board through a 9pin header. Refer to the pin description as follows:



Remark:  
K9=GND

User can design the panel according to the above wiring figure.

## 11.3 External Process Completion Indicator Light

### 11.3.1 Functionality

To guarantee the operation safety, the process completion indicator light functionality is developed for confirming what the current processing status is before operating. It is used for leading out the processing status signal to the control panel to drive an LED or other indicator light showing the processing status.

### 11.3.2 Instruction

Pin OUT2 (Process completion indicator light signal) in MPC6575/MCV1.1 board can be used for driving relay or LED to indicate if the process is completed.

## 11.4 Blow-off

### 11.4.1 Functionality

Blow-off switch controlled through the I/O interface can be used for blowing off the heat and ash produced during the laser engraving and cutting process.

### 11.4.2 Instruction

Pin OUT1(Blow off ON/OFF signal) in MPC6575/MC board is controlled by the machining commands during the processing. The blow-off device will be on when the port is low-voltage. When the port is high-voltage, blow-off device will be off.

## 11.5 Grade Engrave

### 11.5.1 Functionality

The grade engraving power table should be set according to specifications of the laser power supply and laser tube applied to the machine.

## 11.6 Soft Limit under Immediate Mode

### Functionality

This functionality is effective only on the premise that the machine has been to the origin point. Machine will auto-detect if the processing file exceed the worktable range before output.

## 11.7 Control Two Laser Heads

### Functionality

Control the power of the two laser heads independently.

### Instruction

Set power mode to "LaserPowerMode=4", and set the distance of two laser heads.