# Standalone Motion Controller
# DDCS V3.1
# User's Guide

# 1  DDCS V3.1 Controller Introduction

## 1.1 Introduction of Product

Digital Dream has a 10 years history in the numerical control industry, specializing in the research, development and production of various CNC (Computer Numerical Control) systems from 2008. Digital Dream aims to combine high quality and high reliability with affordability. We produce 1 axis to 6 axes CNC system.

The **DDCS V3.1** is a 3 or 4 axis motion controller for stepper and servo systems.DDCS V3.1 is updated from DDCS V1.1 and DDCS V3.1. We are very proud of this product, it combines great power with a tiny footprint and is easy to use. After a very short time you will be familiar with the functions and this manual will help you. The highest output pulse per axis is 500KHz. The pulse width is adjustable (refer to driver manual). The control period of each position is only 4 milliseconds. This provides high control precision for stepper motors and servo motors.

The **DDCS V3.1** numerical control system adopts the ARM+FPGA design framework.  ARM controls the human-computer interface and code analysis and the FPGA provides the underlying algorithms and creates the control pulse. This guarantees reliable control and easy operation. The internal operating system is Linux based.

The panel layout structure of the DDCS V3.1 is very rational to save space. All operations are controlled by only 17 keys and a comprehensive G code set is supported.

The **DDCS** can be used for many styles and types of CNC machines. Lathes, Routers, Pick&Place and Mills are just a few examples. It operates as a Stand Alone system without the need of a computer. This guarantees high precision, accuracy and reliability. The interface, even very comprehensive, can be learned in a very short time.

## 1.2 Performance parameter of the DDCS V3.1

1) 16 opto isolated digital inputs,3 opto isolated digital outputs;

2) Upgrade algorithm,support soft interpolation,fixed arc interpolation bug of the old version;

3) Analog spindle control 0-10V spindle control (can be modified as PWM output);

4) 3-4 axis motor Control.Differential Pulse and direction output signal,Max.500Khz per axis;

5) ARM9 main control chip,FPGA core algorithm chip;

6) 5 inches TFT screen, resolution ratio: 480x272,17 operation keys;

7) 24VDC power input, minimum Current is 0.5A;

8) USB flash disk support for G code file input,no size limited of the G-code file ;

9) 1GB internal memory;

10) Support standard MPG;

11) Jog function for each axis (continuous, step, defined distance);

12) Support the operation of quickly specify the running position;

13) Support for "Power Cut" recovery. Data is automatically saved;

14) Support the origin and Limit share the same Input ports;

15) The controller only support NPN type limited switch.

# 1.3 Appearance, Structure and Size of Product

The **DDCS V3.1** is a small box that can fit in a window of a small control box or control cabinet. Four locking hooks fix this controller from the frame. The dimension you find in picture 1-1 and picture 1-2.

The front panel is 191mm*128mm*5mm；

The main body is 191mm*128mm*37mm；

To mount the unit in an equipment cabinet, cut the hole182.5mm*59mm
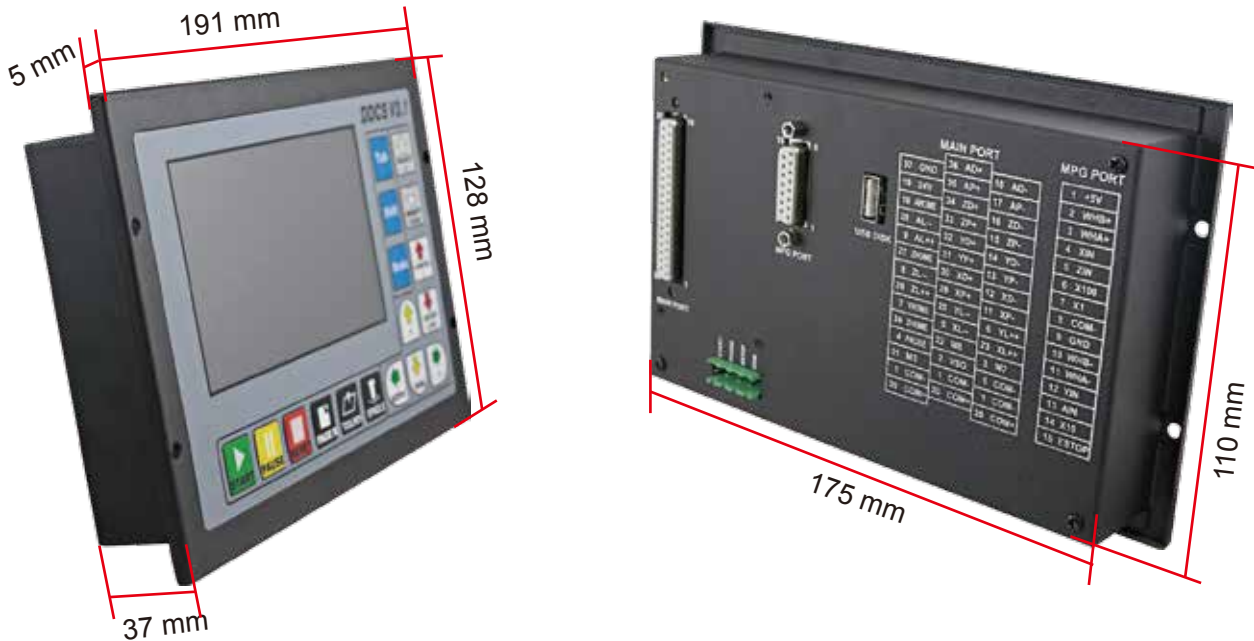


Picture 1-1　　DDCS V3.1 Front and back view and dimensions



Picture 1-2　　DDCS V3.1 Rear view and dimensions

The front panel consists of 17 user keys and the 5'' (480*272) LCD.

5" Screen

DDCS V3.1

17 user's keys

Picture1-3    Front panel

At the back side of the controller,there are USB Disk interface,MPG Port,Main Port and external Start/Pause/Estop interface.

In order to make convenient for the connection,we also apply the 3 layers wiring terminal for main port.

We also supply a DB-15 Ma plug for MPG connection.

The 8 screws are  to fix the wiring terninal and controller.

The U-disk is for the transfer of the G-code file.
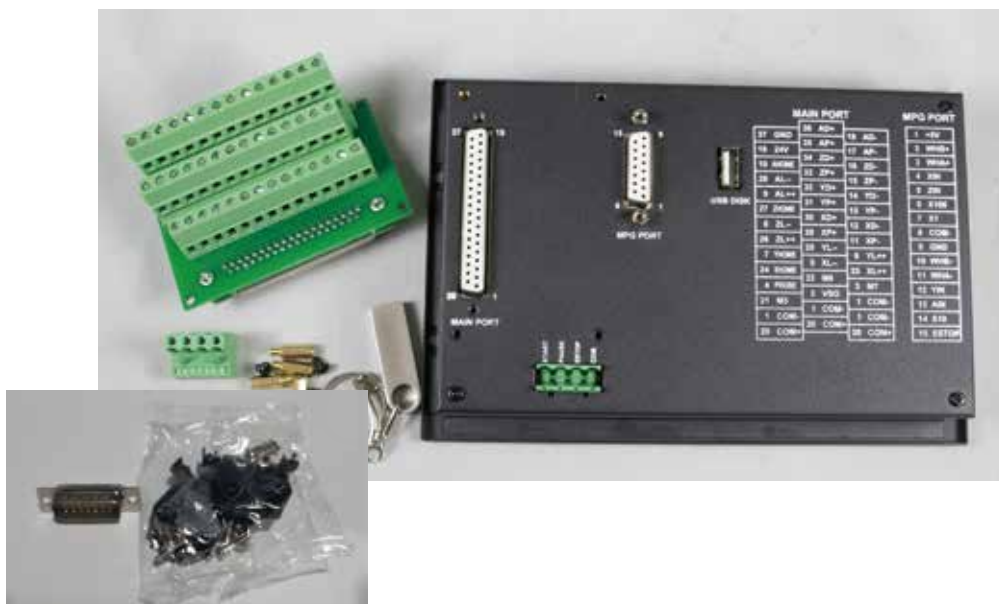
Picture 1-4     Back side of the controller and the accessories

## 1.4 Explanation of Abbreviations

When operating the DDCS, the users will come across some English abbreviations. Here a list with explanations

FRO: Feed Rate Override

SRO: Spindle Rate Override

SRJ: Jog Speed Setting

F: Feed rate, unit is mm/min

S: Spindle Speed, unit rev/min.

X: The coordinate code of the X axis.

Y: The coordinate code of the Y axis.

Z: The coordinate code of the Z axis.

A: The coordinate code of the A axis

BUSY: The system is busy. You still can adjust FRO and SRO

READY: READY mode, any operation can be done

RESET: Reset mode, controller is in "OFF" mode, no operation can be performed

CONT: Continuous mode, each axis can be manually jogged with the arrow keys

Step :Manual Step Mode，each axis can be jogged in defined steps

MPG: MPG mode. Operate the machine with the MPG (Manual Pulse Generator)

AUTO: Run G code. Auto is showing when file is processing

## 1.5 Notes and Warnings

Keep away from exposure to moisture or water. This product contains sophisticated electronics and must not get wet.

Wiring warning: the IO input terminal of this controller supports equipment with source power (such as Inductive Proximity Switch ). When using this kind of equipment, pay attention to the polarity. Avoid the +terminal to be connect with GND. This controllers has analog output for spindle control (0-10V). Please avoid this terminal to ever connect with GND as damage to the controller may occur.

Operation warning. Please observe all security measures when operating the machine. The ESTOP must be connected and properly labelled. In case of a problem, press the E-stop at once to avoid damage to humans, animals and the equipment.

High voltage danger. The DDCS is connected to18-32V DC. Obey and follow the  electricity safety rules of your country when connecting this equipment.
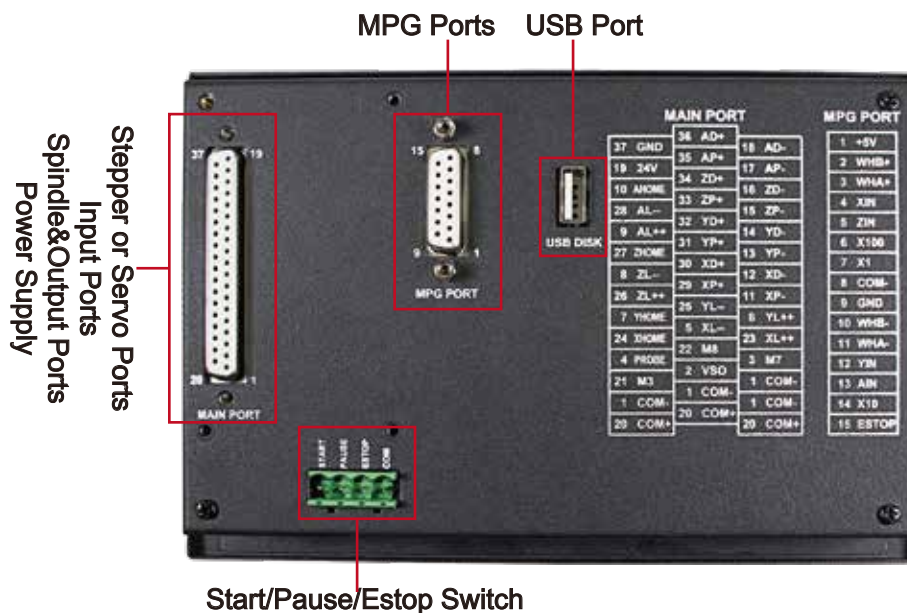
# 2 Wiring

## 2.1 Power supply explanation

In general, the power supply of industrial control's equipment products are complex. They have many different ground levels. The internal power structure of this product is as follows:

See picture 2-1. The Master Power input and MPG module and stepper control module have the same ground. Limit,ESTOP and other input modules as well as the spindle speed control output /M3/M8/M10 and other output modules have the same ground, which use optical isolation. The Limits, E-STOP and other input modules are connected with the same positive. The controller provides 12V as the common + port, without the requirement of the external power source. As for the spindle port, take the output ground for references and the 0-10V adjustable voltages to adjust the spindle speed (refer to spindle VFD manual). The M3/M8/M10 digital output ports pull to ground. You can connect an external relay with up to 50mA direct to 12V+ and the M connector (Solid State relays usually pull between 15 and 20mA)
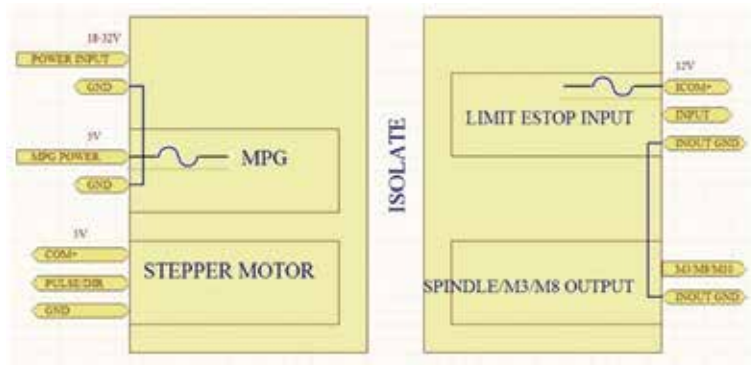


Picture 2-1    Power supply structure

## 2.2 Product Wiring Overview



Picture 2-2    Wiring and Ports

As the picture shows, the wiring section of the controller has Input Ports,Spindle&Output Ports,tepper/Servo control step and direction output,MPG Port, USB Port and Power supply Port.

## 2.3  START/PAUSE/ESTOP Switch Wiring

As Picture 2-3 shows, the power interface,there is a screw termimal for connection. The marks are  the "START"/"PAUSE"/"ESTOP" and "COM" for external switches. And Picture 2-4 is the circuit drawing for the connection.



Picture 2-3      START/PAUSE/ESTOP/COM interface
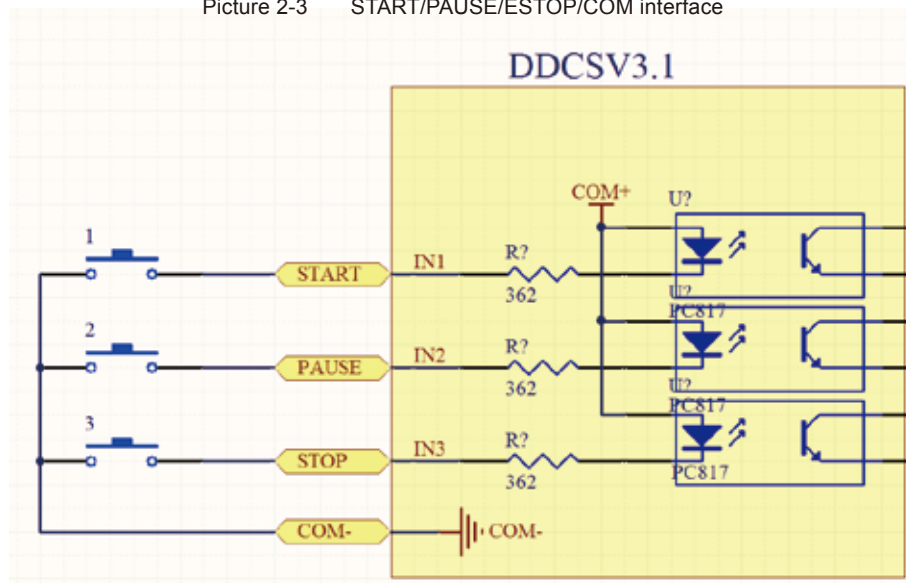


Picture 2-4      Circuit drawing of START/PAUSE/ESTOP/COM

## 2.4  USB Wiring

This USB port is the standard USB A-type. A 50cm USB extension cord with installation plug is supplied with the controller. See sketch diagram picture 2-5 for reference.
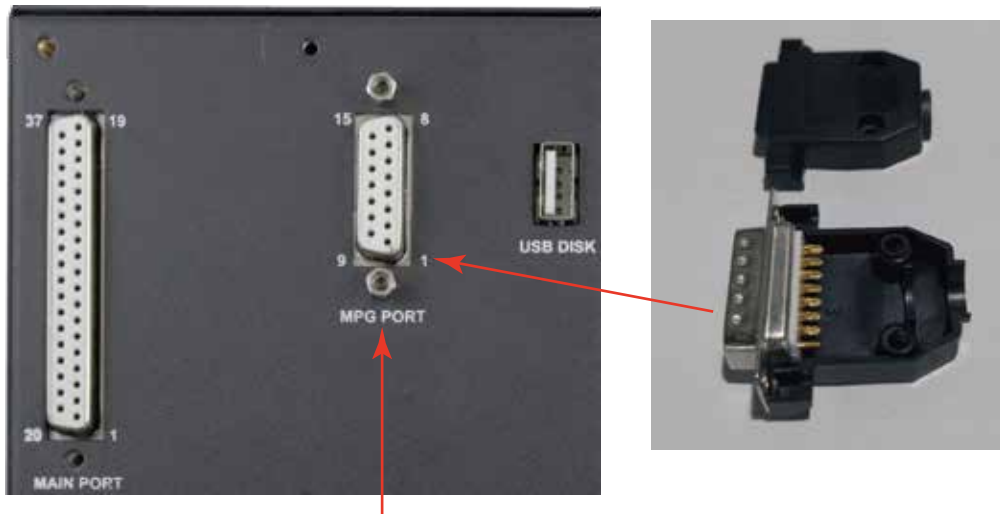


Picture 2-5      USB interface

## 2.5 MPG Port

The MPG port is shown in Picture 2-6. It is the DB15 Female terminals next to the USB port.

The users need to weld the MPG cables into the DB15 Male terminal,and plug-in to the MPG port of the controller MPG port.



Picture 2-6    MPG port and accessory connector for it

The MPG port has 15 pins, see Table 2-1 for reference. See Table 2-2 and table  2-3 for the wiring.

| Pin No. | Pin Mark | Definition | Notes |
|---|---|---|---|
| 1 | +5V-W | MPG Power Supply 5V Positive | Exclusive Power supply Positive of MPG, which can restore the fuse connection with a 200MA of the system power supply. |
| 2 | WHB+ | MPG B phase positive | MPG B differential input positive terminal |
| 3 | WHA+ | MPG A  phase positive | MPG A phase differential input positive terminal |
| 4 | X-IN | Select switch of X axis | Connect with GND,indicates selecting X axis, open indicates no selecting |
| 5 | Z-IN | Select switch of Z axis | Connect with GND,indicates selecting Z axis, open indicates no selecting |
| 6 | X100 | Select switch 100 X | Connect with GND, indicates selecting100 X, open indicates no pulse |
| 7 | X1 | Select switch 1 X | Connect with GND, indicates selecting1 X, open indicates no pulse |
| 8 | COM- | Switch Signal common terminal | the switch signal common trenimal, which can restore the fuse connection with a 200MA of the system power supply. |
| 9 | GND | MPG Power supply Ground | MPG power supply ground |
| 10 | WHB- | MPG B phase negative | MPG B phase differential input negative terminal |
| 11 | WHA- | MPG A phase negative | MPG A phase differential input negative terminal |
| 12 | Y-IN | Select switch of Y axis | Connect with GND, indicates selecting Y axis, open indicates no selecting |
| 13 | A-IN | Select switch of A axis | Connect with GND, indicates selecting A axis, open indicates no selecting |
| 14 | X10 | Select switch 10 X | Connect with GND, indicates selecting10 X, open indicates no pulse |
| 15 | ESTOP | ESTOP of MPG | Connect with GND, indicate ESTOP is in effect.Open indicates Estop is invalid. |

Table 2-1    DDCS's MPG Port

| **DDCS** Wiring Pin | MPG Function | MPG Pin Mark | MPG Output Cable Color |
|---|---|---|---|
| +5V-W | Power Supply + | Vcc(+5V) | Red |
| WHB+ | B Phase + | B+ | White |
| WHA+ | A Phase + | A+ | Green |
| X-IN | X Axis | X | Yellow |
| Z-IN | Z Axis | Z | Brown |
| X100 | X100 Ratio | X100 | Orange |
| X1 | X1 Ratio | X1 | Grey |
| COM- | Enable Switch | COM | Black/Orange |
| GND | Power Supply - | GND | Black |
| WHB- | B Phase - | B- | Purple/Black |
| WHA- | A Phase - | A- | Purple |
| Y-IN | Y Axis | Y | Black/Yellow |
| A-IN | A Axis | A | Black/Brown |
| X10 | X10 Ratio | X10 | Black/Grey |
| ESTOP | ESTOP | ESTOP | Blue |

Table 2-2    DDCS Wiring with standard MPG

Note:  It you want to use the single-terminal MPG (there is no A-B-MPG), please refer to table 2-3 for reference. As for the unlisted MPG, please take the differential MPG wiring mode.

| **DDCS** Wiring Pin Mark | MPG Pin Mark and Color | |
|---|---|---|
| WHA+ | A+ | Green |
| WHA- | 0V | Black |
| WHB+ | B+ | White |
| WHB- | 0V | Black |

Table 2-3    DDCS Wiring with Single-terminal MPG

## 2.6 Main Port Wiring

Picture 2-7 shows the main port position:
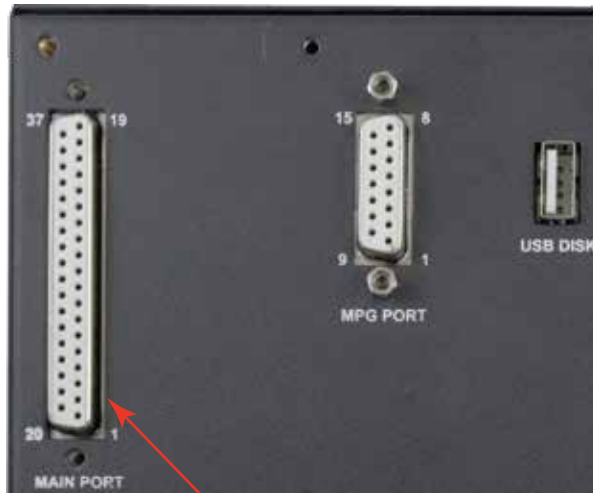


Picture 2-7    Main Port

We also supply a wiring terminal to fit the 37 female pins,which make the convenient for the wiring.Pls note the following photo.At the termimal 4 conners,there are screws to make the terminal locked-onto the controller.



Picture 2-8    Main Port with wiring terminal

There are 3 layers of the Wiring Terminal.Pls note the following photo,which showed the pin No.s and Pin Mark and definition.It include:

1) Stepper/Servo Output Ports;

2) The Spindle Control Output Ports;

3) The E-stop,Limit,Home and Probe and other Inputs ports;

4) 24V DC Power Supply ports for the Controller;

5) 24V DC  Power Supply ports for the I/O Unit.

Picture 2-9 shows the 3-layers and the orders of the pin no.Table 2-4 and 2-5 shows the Pin mark and definition.
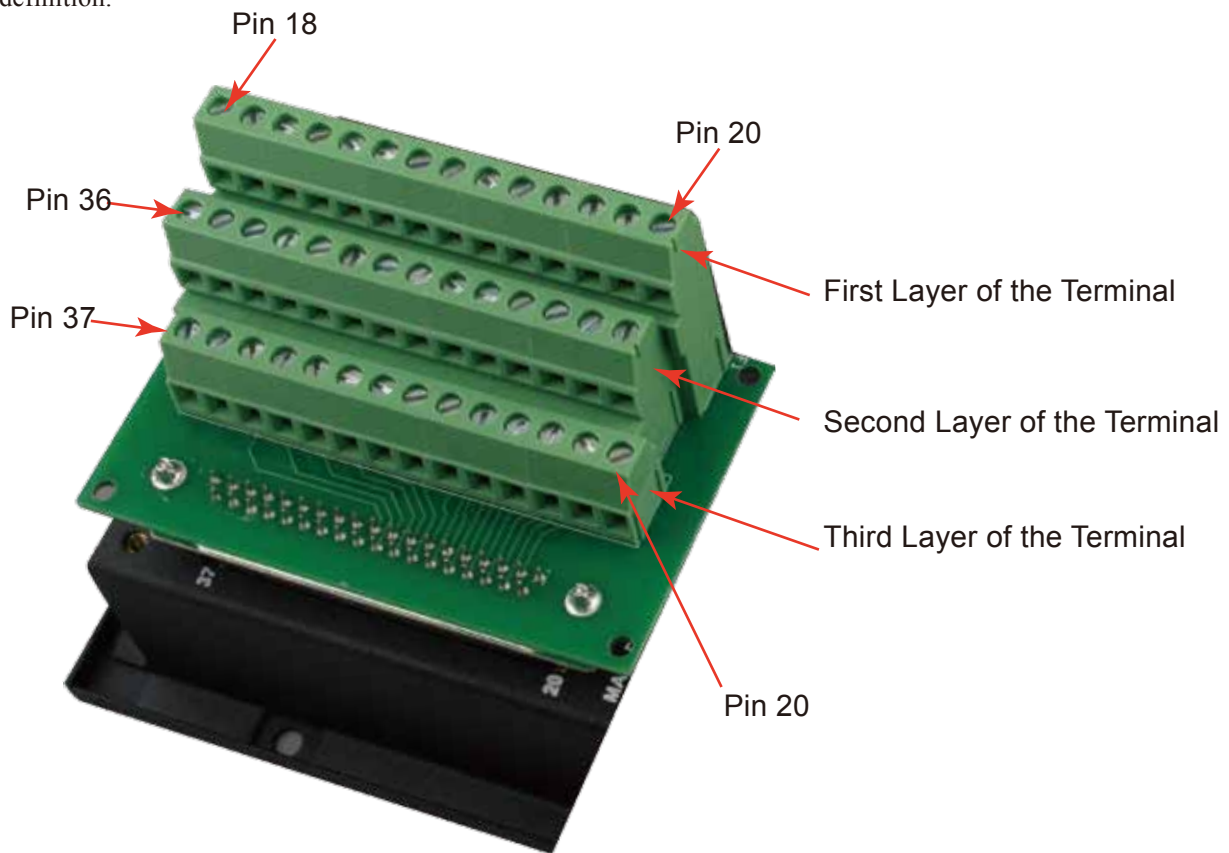


Picture 2-9    3-Layers wiring terminal

| First Layer of the Terminal | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PIN 18 | PIN 17 | PIN 16 | PIN 15 | PIN 14 | PIN 13 | PIN 12 | PIN 11 | PIN 6 | PIN 23 | PIN 3 | PIN 1 | PIN 1 | PIN 20 |
| AD- | AP- | ZD- | ZP- | YD- | YP- | XD- | XP- | YL++ | XL++ | M8 | COM- | COM- | COM+ |
| **Second Layer of the Terminal** | | | | | | | | | | | | | |
| PIN 36 | PIN 35 | PIN 34 | PIN 33 | PIN 32 | PIN 31 | PIN 30 | PIN 29 | PIN 25 | PIN 5 | PIN 22 | PIN 2 | PIN 1 | PIN 20 |
| AD+ | AP+ | ZD+ | ZP+ | YD+ | YP+ | XD+ | XP+ | YL-- | XL-- | M10 | VSO | COM- | COM+ |
| **Third Layer of the Terminal** | | | | | | | | | | | | | |
| PIN 37 | PIN 19 | PIN 10 | PIN 28 | PIN 9 | PIN 27 | PIN 8 | PIN 26 | PIN 7 | PIN 24 | PIN 4 | PIN 21 | PIN 1 | PIN 20 |
| GND | 24V | AHOME | AL-- | AL++ | ZHOME | ZL-- | ZL++ | YHOME | XHOME | PROBE | M3 | COM- | COM+ |

Table 2-4    Main Port Pin No. and Mark

## First Layer of the Terminal

| Pin No. | Pin Mark | Definition |
|---|---|---|
| PIN 18 | AD- | Direction Signal Negative Output of A Axis (5V) |
| PIN 17 | AP- | Pulse Signal Negative Output of A Axis (5V) |
| PIN 16 | ZD- | Direction Signal Negative Output of Z Axis (5V) |
| PIN 15 | ZP- | Pulse Signal Negative Output of Z Axis (5V) |
| PIN 14 | YD- | Direction Signal Negative Output of Y Axis (5V) |
| PIN 13 | YP- | Pulse Signal Negative Output of Y Axis (5V) |
| PIN 12 | XD- | Direction Signal Negative Output of X Axis (5V) |
| PIN 11 | XP- | Pulse Signal Negative Output of X Axis (5V) |
| PIN 6 | YL++ | Limited Signal Input at Y++ direction |
| PIN 23 | XL++ | Limited Signal Input at X++ direction |
| PIN 3 | M8 | Start Cooling Signal Output for Spindle |
| PIN 1 | COM- | All between "COM+"s are conducting.All between "COM-"s are conducting. Between COM+ and COM- there is 24VDC power.COM+ and COM- is the power supply for I/O Unit,for example the relay.COM+ is Positive side and COM- is Negative side. |
| PIN 1 | COM- | |
| PIN 20 | COM+ | |

## Second Layer of the Terminal

| Pin No. | Pin Mark | Definition |
|---|---|---|
| PIN 36 | AD+ | Direction Signal Positive Output of A Axis (5V) |
| PIN 35 | AP+ | Pulse Signal Positive Output of A Axis (5V) |
| PIN 34 | ZD+ | Direction Signal Positive Output of Z Axis (5V) |
| PIN 33 | ZP+ | Pulse Signal Positive Output of Z Axis (5V) |
| PIN 32 | YD+ | Direction Signal Positive Output of Y Axis (5V) |
| PIN 31 | YP+ | Pulse Signal Positive Output of Y Axis (5V) |
| PIN 30 | XD+ | Direction Signal Positive Output of X Axis (5V) |
| PIN 29 | XP+ | Pulse Signal Positive Output of X Axis (5V) |
| PIN 25 | YL-- | Limited Signal Input at Y-- direction |
| PIN 5 | XL-- | Limited Signal Input at X-- direction |
| PIN 22 | M10 | Start Lubrication Signal Output for Spindle |
| PIN 2 | VSO | Speed output（0-10V）VSO Signal Output |
| PIN 1 | COM- | All between "COM+"s are conducting.All between "COM-"s are conducting. Between COM+ and COM- there is 24VDC power.COM+ and COM- is the power supply for I/O Unit,for example the relay.COM+ is Positive side and COM- is Negative side. |
| PIN 20 | COM+ | |

## Third Layer of the Terminal

| Pin No. | Pin Mark | Definition |
|---|---|---|
| PIN 37 | GND | Power Supply Ground |
| PIN 19 | 24V | Power Supply for Controller 24VDC Input Positive Side |
| PIN 10 | AHOME | Home Signal Input of A Axis |
| PIN 28 | AL-- | Limited Signal Input at A-- direction |
| PIN 9 | AL++ | Limited Signal Input at A++ direction |
| PIN 27 | ZHOME | Home Signal Input of Z Axis |
| PIN 8 | ZL-- | Limited Signal Input at Z-- direction |
| PIN 26 | ZL++ | Limited Signal Input at Z++ direction |
| PIN 7 | YHOME | Home Signal Input of Y Axis |
| PIN 24 | XHOME | Home Signal Input of X Axis |
| PIN 4 | PROBE | Probe Signal Input |
| PIN 21 | M3 | Start Spindle Signal Output |
| PIN 1 | COM- | All between "COM+"s are conducting.All between "COM-"s are conducting. Between COM+ and COM- there is 24VDC power.COM+ and COM- is the power supply for I/O Unit,for example the relay.COM+ is Positive side and COM- is Negative side. |
| PIN 20 | COM+ | |

Table 2-5　　Main Port Pin No. and definition

## 2.6.1 Spindle control output

PIN3(M8),PIN22(M10),PIN2(VSO) and PIN21(M3) is for spindle control output.The spindle control output terminal offers connections for Start and Stop of the Spindle (M3/M5), Start/Stop of Cooling (M8/M9) and Start/Stop of Lubrication (M10/M11). These three output terminals are signals open to ground. The highest electric current can be absorbed is 50mA. The speed controlling output terminal can output 0-10V. It can adjust the speed of the spindle motor by sending the voltage between 0 and 10V to the VFD according the the Spindle Speed Setting.

Controlling the speed of a spindle with a VFD (variable frequency drive) only needs the Start/Stop signal and the 0-10V signal to control the frequency.

The following table 2-6 shows the wiring with Sunfar VFD:



| DDCS V3.1 Wiring pin | SUNFAR E300 |
| --- | --- |
| Speed output（0-10V）PIN2(VSO) | AI |
| Start and stop of spindle PIN21(M3) | FWD |
| Output ground | CM |

Table 2-6    **DDCS** and VFD wiring

PIN3(M8),PIN22(M10) and PIN21(M3) is also can be used for OUTPUT ports.For example,it can be used for a Relay output port.For example the picture 2-10 shows the wiring methods:
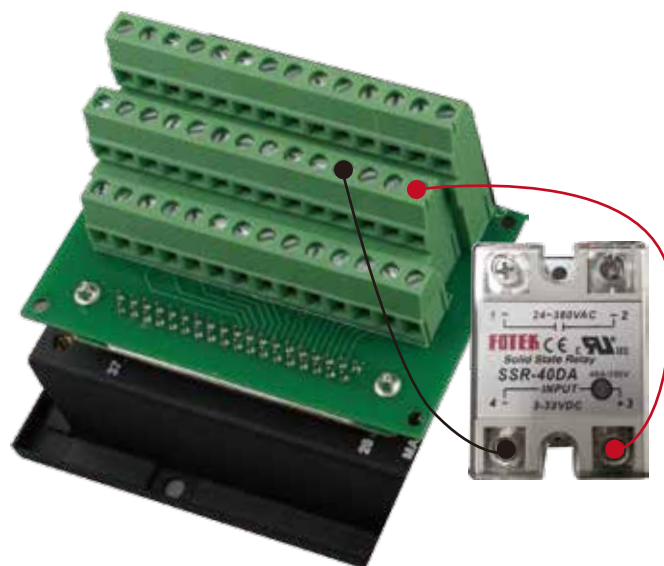


Picture 2-10    Wiring Methods with Relay

## 2.6.2 Limit, Home and Probe Inputs,and the Power for the Input

PIN6(YL++),PIN23(XL++),PIN25(YL--),PIN5(XL--),PIN28(AL--),PIN9(AL++),PIN8(ZL--),PIN26(ZL++) are the Limit ports.

PIN10(AHOME),PIN27(ZHOME),PIN7(YHOME),PIN24(XHOME) are the Home Ports.

PIN4(PROBE) is the Probe Port.

The following wiring pictures and circuit pictures will show the connection of the Limit,Home and Probe Wiring.



Picture 2-11        LIMIT,HOME and PROBE input signal circuit



Picture 2-12    The Limit wiring at X++ direction with mechanical limited switch
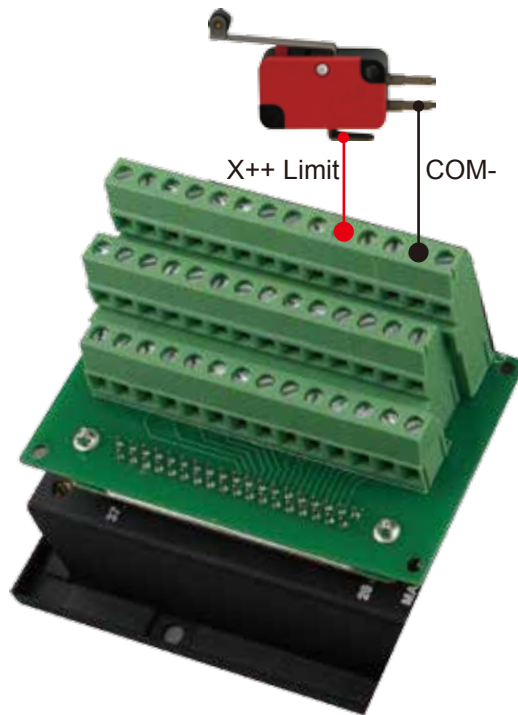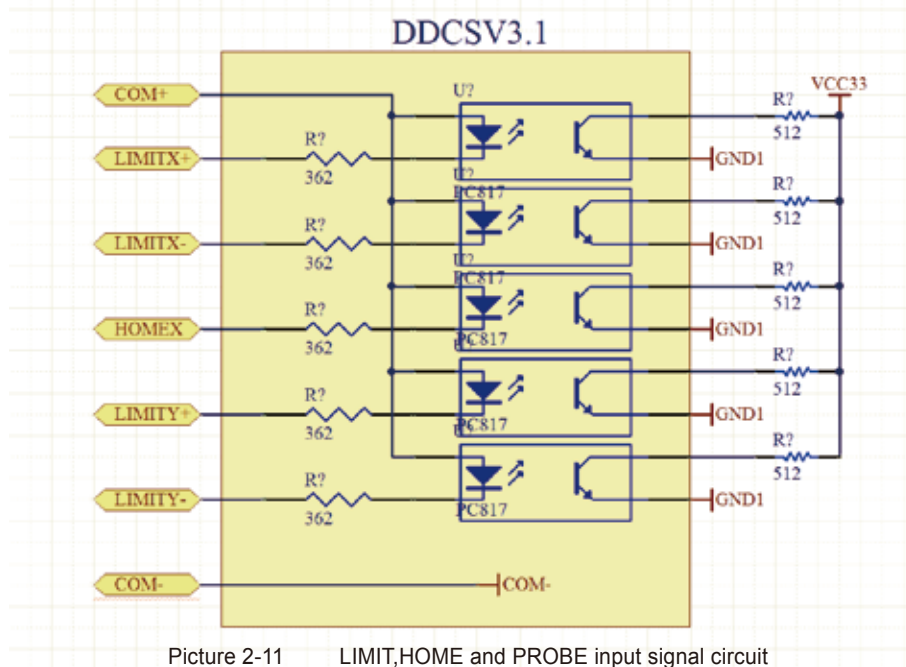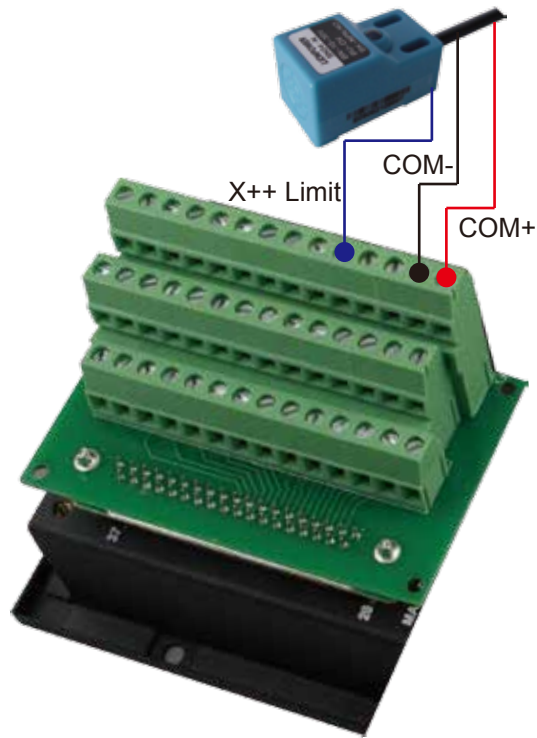
Picture 2-13    The Limit wiring at X++ direction with 3-line proximity switch
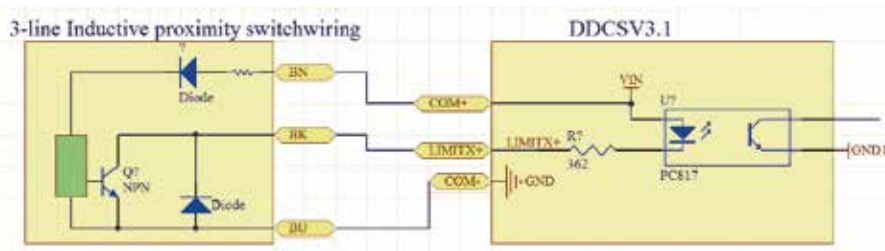


Picture 2-14    The circuit of 3-line Inductive proximity switch
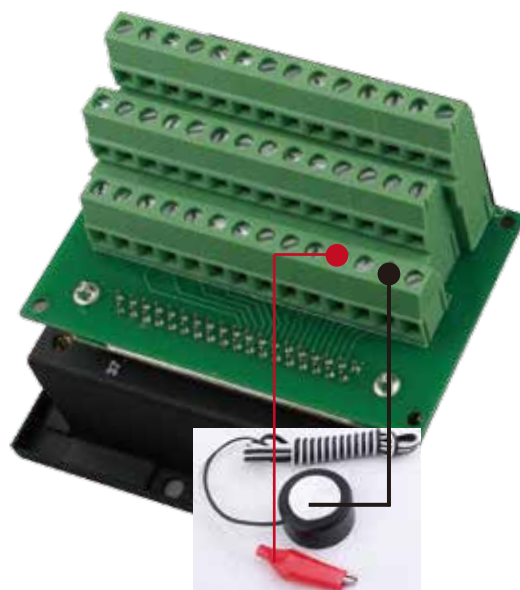


Picture 2-15    The Probe Wiring

### 2.6.3  Stepper/Servo Control Output

The stepper/servo control output,we cite differential Pulse and Direction output method,Max. 500Khz per axis.DDCS V3.1 there is 3 or 4 axis for option

PIN 18 (AD-),PIN 36 (AD+),PIN 17 (AP-),PIN 35 (AP+)  is A Axis Control Output Pins;

AD- means the Direction signal negative output for A axis,AP+ means the Direction signal positive output for A axis,AP- means the Pulse signal negative output,AP+ means the Pluse Signal positive output.

The Pulse and Direction signal output voltage is ±5V.

PIN 16 (ZD-),PIN 34 (ZD+),PIN 15 (ZP-),PIN 33 (ZP+) is Z Axis Control Output Pins;

PIN 14 (YD-),PIN 32 (YD+),PIN 13 (YP-),PIN 31 (YP+) is Y Axis Control Output Pins;

PIN 12 (XD-),PIN 30 (XD+),PIN 11 (XP-),PIN 29 (XP+) is X Axis Control Output Pins.

The following picture 2-16 is the example of stepper driver wiring as X axis.
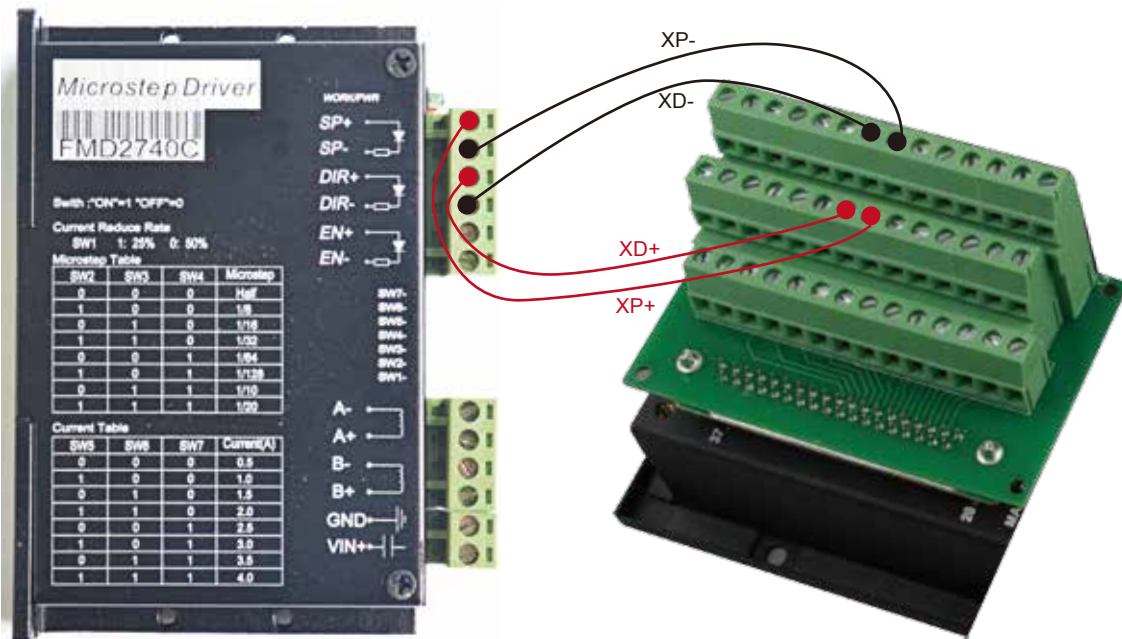


Picture 2-16     The Stepper driver wiring as X Axis

# 3    Software Operation and Parameter Settings

## 3.1    Interface description

The software interface contains 3 pages. Main page, File page and Configuration page.

### 3.1.1    Main page
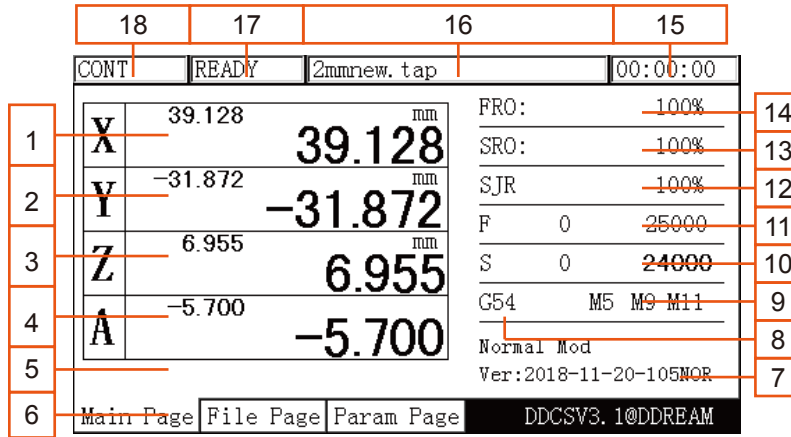


Picture 3-1        Main page

The picture 3-1 shows the Main page of the **DDCS**. It is divided into status column, coordinate display column, basic parameter column, and notification column. In total, it is divided into 18 sections in detail. Here the detailed description of the 18 sections :

1、 X Coordinate

This column shows the current coordinate value of X. The display range is -99999.999~+99999.999, the minimum JOG value is 0.001.

2、 Y Coordinate

This column shows the current coordinate value of Y. The display range is -99999.999~+99999.999, the minimum JOG value is 0.001.

3、 Z Coordinate

This column shows the current coordinate value of Z. The display range is -99999.999~+99999.999, the minimum JOG value is 0.001.

4、 A Coordinate（This section has no definition in the 3-axis）

This column shows the current coordinate value of A. The display range is -99999.999~+99999.999, the minimum JOG value is 0.001.

5、 Current Operation

When the controller runs the G code file, it will show the current operation line number and coordinates. When the operation state is READY, it will show nothing

6、 Page

The page shows the current page. This controller has 3 pages, Main Page, File Page and Configuration Page. Press Page button to move between the Pages.

7、 Operation Window

This message window switches between 3 displays.  It shows the prompt message of several keys and the 2nd (second function)

The message displayed while in normal state is: Normal Mode.

The message displayed of the 2nd function status is:
X-: goto, Y-: zero, Z-: home, A-: probe, Pause: goto break

If you now click X-, the machine will move to Zero. If you click A-, the probe function will be activated. If you click Y-, all coordinates will be set to Zero. If you click Z-, the machine will home. If you click Start, the Start Line window appears and you can enter the G-code line you want to start from. Click on Pause to enter the breakpoint CONT Callback Function.

Tip:
 You need to click these functions twice to activate them (first click is "select", second click is "activate".

Tip:
When you are in an Editing Window, you can insert values by using the following keys:
X-: moves the cursor left
X+: moves the cursor right
Y-: decrease the value
Y+: increases the value
Z-: Enter
Z+: Cancel

## 8  Coordinate System

With the CR8-500 control panel it is very easy to control your Machine Coordinates and Work Offset Coordinates. Click FRO/SRO/SJR (from now on only called FRO) 6 times until the coordinate system is highlighted. Here you can display G54 to G59 and MACH (Machine Coordinates) by clicking A+ and A-

Tip
After selecting a function with the FRO key you use the A+ button to Select and the
A-     button to Modify the value.
If the function can be edited, the Editing Window will open and you can edit with:
X-: moves the cursor left
X+: moves the cursor right
Y-: decrease the value
Y+: increases the value
Z-: Enter
Z+: Cancel

## 9、Status of M3/M5,M8/M9 or M10/M11
M3/M5: Start/Stop Spindle
M8/M9 : Start/Stop of Cooling
M10/M11: Start/Stop of Lubrication

## 10、Speed of spindle

S stands for Spindle Speed. Click FRO till S is highlighted,click A- to modify and edit the value you want.

The display shows two values. The left value is the real time Spindle Speed, the right value shows the default Spindle Speed. The Default Spindle Speed can be changed, use the A- key to modify.

## 11、Feed speed

F stands for Feed Speed. Click FRO till F is highlighted, click A- to modify and edit the value you want.

The display shows two values. The left value is the real time Feed Speed, the right value shows the default Feed Speed. The Default Feed Speed can be changed, use the A- key to modify and edit.

12、SJR

SJR controls the jogging of the machine. Click FRO till SJR is highlighted.

First Option: MODE

Check window 18 and you can see what Jog Mode you are in. By clicking MODE you can change Jogging to Continuous, Step or to MPG, Window 18 will display this function.

When in Cont Mode, A+ and A- can adjust the speed in 10% increments

When in Step Mode, A+ and A- can change from 0.01mm to 0.1mm to 1mm and to 10mm

When in MPG mode you can use the MPG to jog the machine

Second Option: Jog a defined distance

13、SRO

SRO controls the Spindle Speed. Click FRO till SRO is highlighted, use A+ and A_to adjust the Spindle Speed in 10% increments

14、FRO

FRO controls the Feed Speed. Click FRO till FRO is highlighted. Use A+ and A- to adjust the Feed Speed in 10% increments

15、Working time

This column shows the processing time of the G code operation. Time keeping is halted during Pause

16、Processing file

This column shows the name of the processing files. In the formal situation, it only shows the filename. Under the situation of CONT adjust, it will also show the content of the file.

17、Operating Status

This column shows the operating state. The status and implications can be displayed as follows:

Busy: Operation is running

Reset: Reset flashing = controller not active. To activate the controller click Reset

READY: Ready state. Controller is ready and all operations can be performed

18、Feed status

This window shows the feed status of Jogging and File Processing.

AUTO: displayed while processing and executing the G code file

CONT: indicates Jog CONTINUOUS. You can Jog manually with the "-"or "+" keys of X Y Z and A. A short click will move the axis in the defined step, a long click will move the axis till you let go

Step: Jogging in Step Mode

### 3.1.2 File Management Page

Click the Page button once and the File Management Page will open



Picture 3-2     File management page

As the picture 3-2 shows, the file management page can be divided into 4 columns

1、 Change Directory

2、 File list of current Directory

3、 Files size column  Shows file size in byte

4、 Modification time and date

### 3.1.3 Configuration Page

Click the Page button once and the File Management Page will open:



Picture 3-3     Configuration page

As the picture 3-3 shows, the configuration page can be divided into 4 columns:

1. Parameter Number

Each parameter has a specific number, the parameter can be modified .

2. Parameter Name

The definition of the Parameter is listed in the Parameter Name column. All Parameters are divided into groups according to their function.

3. Parameter Value

The Parameter Value column lists the value of each Parameter. This value can be configured

4. Parameter Unit

The Parameter Unit lists the unit of each parameter.

# 3.2 Definition of Keys
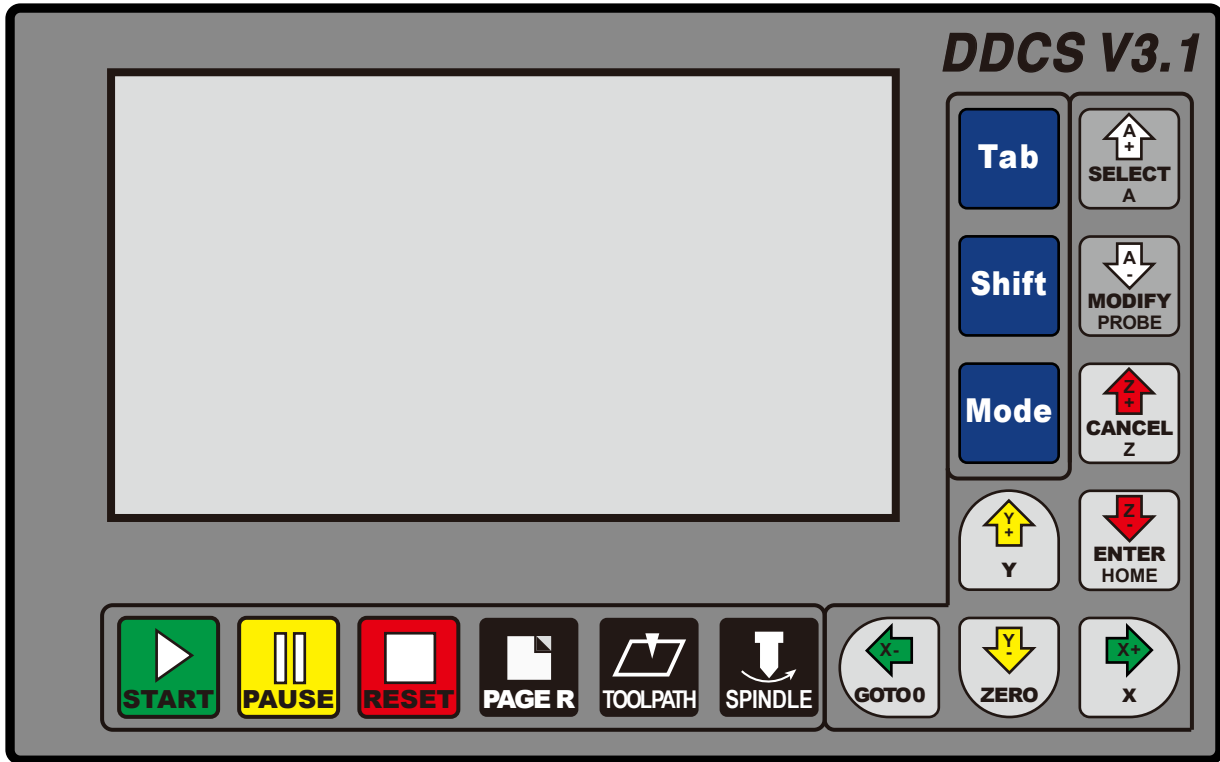
The picture 3-4 shows the key layout of the **DDCS**. The Controller **DDCS** has 17 keys. Please see table 3-1 for reference.

| Keys Icon | Function No. | Definition | Notes |
|---|---|---|---|
| START | 1 | Start operation | After loading the G code file, please press this key to start the operation. In case of Pause Status, press this key to continue the processing operation. |
| PAUSE | 1 | Pause operation | Press this key to Pause the operation. |
| RESET | 1 | Reset and E-STOP | If Reset is blinking, press this key to activate the controller. Press this key to stop processing urgently. |
| PAGE R | 1 | Page switch | Switch through File Management Page, Processing Main Page and Parameter Configuration Page. |
| TOOLPATH | 1 | Toolpath display switch | Switch the display between Coordinate Display or Tool Path Tracking display. |
| SPINDLE | 1 | Spindle manual start/close | Press this key to manually switch the spindle on or off. Can not be used if Reset is blinking and while processing an operation (Busy) |

| Keys Icon | Function No. | Definition | Notes |
|---|---|---|---|
| GOTO0 (X-) | 3 | 1: X axis moves left; 2: Cursor moves left 3: Goto Zero function | In "CONT Mode", the X axis will Continuously move negative after pressing this key. In "STEP Mode" X will move negative in steps. When in "Line Editing" or default F/S value modification, this key moves the cursor left. When in "2nd Function", this key has the goto Zero function. |
| X (X+) | 3 | 1: X axis moves right; 2: Cursor moves right 3: X axis select | In "CONT Mode", the X axis will Continuously move positive after pressing this key. In "STEP Mode" X will move positive in steps. When in "Line Editing" or default F/S value modification, this key moves the cursor right. When in "home/zero-clearing/ gotoz", this key opens the X axis coordinate edit window. |
| Y (Y+) | 3 | 1: Y axis moves forward; 2: Parameter value increases 3: Y axis select | In "CONT Mode", the Y axis will continuously move positive after pressing this key. In "STEP Mode" Y will move positive in steps. When in "Line Editing" or default F/S value modification, this key increases the value. When in "home/zero-clearing/ gotoz",this key this key opens the Y axis coordinate edit window. |
| ZERO (Y-) | 3 | 1: Y axis move backward; 2: Parameter value decreases; 3: Start the current coordinate 0-clearing | In "CONT Mode", the Y axis will continuously move negative after pressing this key. In "STEP Mode" Y will move negative in steps. When in "Line Editing" or default F/S value modification, this key decreases the value. When you start the 2nd function, this key has the Ycoordinate function. |
| CANCEL Z (Z+) | 3 | 1: Z axis Plummer block 2: Z axis select 3: cancel | In "CONT Mode", the Z axis will continuously move positive after pressing this key. In "STEP Mode" Z will move positive in steps. When in "home/zero-clearing/ gotoz", this key opens Z axis coordinate edit window. This key is also CANCEL key. |
| ENTER HOME (Z-) | 3 | 1: Z axis down 2: home 3: enter/select | In "CONT Mode", the Z axis will continuously move negative after pressing this key. In "STEP Mode" Z will move negative in steps. This key serves as the ENTER key and also is the HOME key |
| MODIFY PROBE (A-) | 4 | 1: A axis rotates in forward direction 2: A axis select 3: parameter increases 4: F/S default select/cancel | In "CONT Mode", the A axis will continuously move positive after pressing this key. In "STEP Mode" A will move positive in steps. When in "home/zero-clearing/ gotoz", this key opens the A axis coordinate edit window. When in FRO/ SRO/ SJR this key increases the parameter value. When in F or S, this key switches between default value or G code value |
| SELECT A (A+) | 4 | 1: A axis rotates in inversion direction 2: Probefunction 3: Parameter decreases 4: F/S default modification | In "CONT Mode", the A axis will continuously move negative after pressing this key. In "STEP Mode" A will move negative in steps. When in 2nd function, this key activates the PROBE. When in FRO/ SRO/ SJR this key decreases the parameter value. When in F or S, this key will open the Editing Window |
| Tab | 2 | 1: FRO/SRO/SJR/F/S/G; 2: file copy | This switch will highlight the processing parameters FRO/ SRO/SJR/F/S/G54-59-MACH/M3-M11 While in BUSY it can activate FRO and SRO In File Management this is the COPY key |
| Shift | 2 | 1: Second function start 2: file paste | This key will shift to the second Mode (goto, zero, home, probe, goto breakpoint) . In File Management it is the PASTE key |
| Mode | 2 | 1: mod switch 2: file delete | When in READY, this key changes the Jog mode from Continuous to Step and MPG control. In File Management it is the DELETE key |

Table 3-1    List of Keys' function

## 3.3 Operation of common functions

TIP

Do not press two keys at the same time

For example: **Shift** + [MODIFY PROBE] indicates that you should first press **Shift** and then release this

key, then press [MODIFY PROBE]

### 3.3.1 File Management

When in the Main Page press [PAGE R] to enter the File Page, See Picture 3-5



| CONT | READY | 2mmnew.tap | | 00:00:00 |
|---|---|---|---|---|

| Name | Size | Time |
|---|---|---|
| .. | [DIR] | 1970/01/09 08:25 |
| BMP0.bmp | 261174 | 1970/01/01 00:00 |
| BMP1.bmp | 261174 | 1970/01/01 00:00 |
| BMP2.bmp | 261174 | 1970/01/01 00:00 |
| BMP3.bmp | 261174 | 1970/01/01 00:01 |
| 2mmnew.tap | 1525367 | 2018/12/23 10:39 |
| ball1.nc | 1653221 | 2017/12/27 10:26 |

| F1-COPY | F2-PASTE | F3-EDIT | F4-NAME | INS-NEW | DEL-DEL |
|---|---|---|---|---|---|
| Main Page | File Page | Param Page | | DDCSV3.1@DDREAM | |

Picture 3-5     File management page

The displays will show all folders and files in the root directory. The Name of folders and files, the size of files and the time and date of manipulation. The blue strip indicates the current valid target location.

Press [Y] to move up

Press [ZERO] to move down

Press [CANCEL Z] to quit the file management page

Press [ENTER HOME]  If the blue bar is at " . ." , the Enter button will change to the last directory. If the blue bar

highlights a folder, it will open the folder. If the blue bar highlights a G code file, this button will load the G code and go back to the Main Page for processing. If the blue bar highlights a .set file, it will upgrade the system. In this case make sure you delete the settings file or the upgrade will overwrite the original settings file too and you will lose your settings.

1）Copy the file



Picture 3-6    Select 2mmnew.tap file and copy the file

Hrere the 2mmnew.tap file is selected. Press the **Tab** key to copy the 2mmnew.tap file into memory

2）Paste the file



Picture 3-7    Switch to the target folder

Choose your target directory or target folder, click **Shift** to paste the 2mmnew.tap file to this directory. See picture 3-8 for reference



Picture 3-8    Paste the 2mmnew.tap file to this directory

3) Delete a file

Highlight the required file and click **Mode** to delete the file

```
CONT      READY     2mmnew.tap              00:00:00
      Name              Size              Time
..                      [DIR]        1970/01/09 08:25
BMP0.bmp               261174        1970/01/01 00:00
BMP1.bmp               261174        1970/01/01 00:00
BMP2.bmp               261174        1970/01/01 00:00
BMP3.bmp               261174        1970/01/01 00:01
BMP4.bmp               261174        1970/01/01 00:01
BMP5.bmp               261174        1970/01/01 00:01
BMP6.bmp               261174        1970/01/01 00:04
2mmnew.tap            1525367        2018/12/23 10:39
ball1.nc             1653221        2017/12/27 10:26


  F1-COPY |F2-PASTE| F3-EDIT | F4-NAME | INS-NEW | DEL-DEL
Main Page|File Page|Param Page      DDCSV3.1@DDREAM
```

Picture 3-9      Move the blue strip to the 2mmnew.tap file, click MODE to delete

```
CONT      READY     2mmnew.tap              00:00:00
      Name              Size              Time
..                      [DIR]        1970/01/09 08:25
BMP0.bmp               261174        1970/01/01 00:00
BMP1.bmp               261174        1970/01/01 00:00
BMP2.bmp               261174        1970/01/01 00:00
BMP3.bmp               261174        1970/01/01 00:01
BMP4.bmp               261174        1970/01/01 00:01
BMP5.bmp               261174        1970/01/01 00:01
BMP6.bmp               261174        1970/01/01 00:04
BMP7.bmp               261174        1970/01/01 00:04
BMP8.bmp               261174        1970/01/01 00:06
ball1.nc             1653221        2017/12/27 10:26


  F1-COPY |F2-PASTE| F3-EDIT | F4-NAME | INS-NEW | DEL-DEL
Main Page|File Page|Param Page      DDCSV3.1@DDREAM
```

Picture 3-10      Delete the 2mmnew.tap file

4) Load the G code file

Highlight the G code file required and click **ENTER HOME** . The file will be loaded and the screen will change

back to the Main Screen for processing. The file name will be displayed.

```
CONT      READY     2mmnew.tap              00:00:00
      Name              Size              Time
..                      [DIR]        1970/01/09 08:25
BMP0.bmp               261174        1970/01/01 00:00
BMP1.bmp               261174        1970/01/01 00:00
BMP2.bmp               261174        1970/01/01 00:00
BMP3.bmp               261174        1970/01/01 00:01
BMP4.bmp               261174        1970/01/01 00:01
BMP5.bmp               261174        1970/01/01 00:01
BMP6.bmp               261174        1970/01/01 00:04
BMP7.bmp               261174        1970/01/01 00:04
BMP8.bmp               261174        1970/01/01 00:06
BMP10.bmp              261174        1970/01/01 00:07
2mmnew.tap            1525367        1970/01/01 00:07
  F1-COPY |F2-PASTE| F3-EDIT | F4-NAME | INS-NEW | DEL-DEL
Main Page|File Page|Param Page      DDCSV3.1@DDREAM
```

Picture 3-11      Search for the file2mmnew.tap

```
CONT      READY     2mmnew.tap              00:00:00
      X    0.000      mm     FRO:           100%
              0.000          SRO:           100%
      Y    0.000      mm     SJR            100%
              0.000          F      0      25000
      Z    5.000      mm     S      0      24000
              5.000          G54      M5 M9 M11
      A    0.000      mm     Normal Mod
              0.000          Ver:2018-11-20-105NOR
Main Page  File Page  Param Page    DDCSV3.1@DDREAM
```

Picture 3-12      After loading the file 2mmnew.tap the file name will be displayed

### 3.3.2 Running a G code file

1)  Start running G code

    After loading the G code file, make sure the controller is in READY. If RESET is blinking, just press

the **RESET** key and ensure the operation status column displays READY.

    Now set ZERO as requested. For example, if the G code file defines the work piece center as the XY ZERO point, move the cutter to that position.

    Click the **Shift** button and then click the **ZERO** button. The Operation Window will give you

several options. Click **X** and an EDIT WINDOW will open. Click **ENTER HOME** to Zero X.

    Click the **Shift** button again and then click the **ZERO** button. Now click **Y** to select Y

Axis and an EDIT WINDOW will open. Click **ENTER HOME** to Zero Y.

    After ZERO is set, press **START** to run the G code file. During Gcode processing, only the function

of **PAUSE** and **RESET** are valid. The **Tab** key can set the values of FRO (Prosessing Speed) and SRO (Spindle Speed).

    See Picture 3-13.

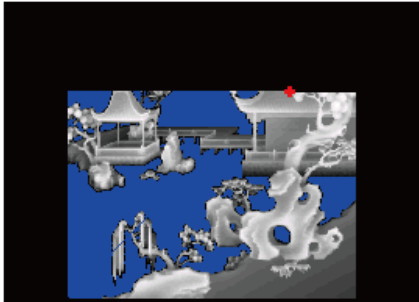    Look at Current Operation (just below the Axis Read Out). It shows that the G code has been processed

to line 180th. The controller now is in BUSY Mode. Press **TOOLPATH** to switch the display to show the tool path. Picture3-14,15 and 16 show the tool path display.

Picture 3-13     G code processing



Picture 3-14     Tool path display after processing at beginning the file



Picture 3-15     Tool path display after processing most of the file
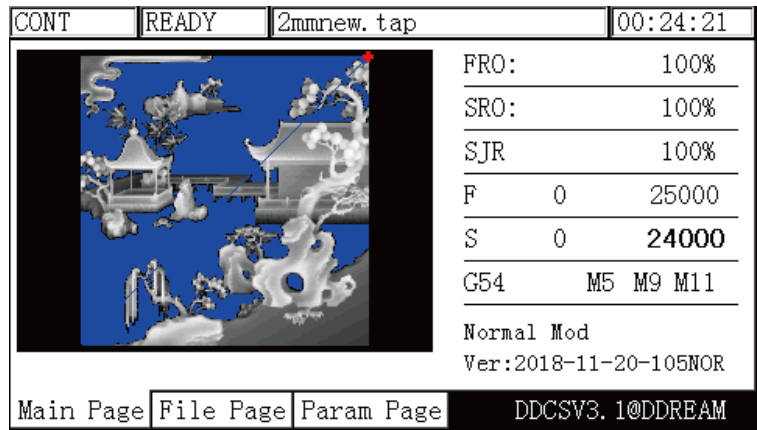
Picture 3-16　　　Tool path display, processing completed

2) Breakpoint operation

Press **Shift** to enter the second mode. Click **PAUSE** to enter the breakpoint operation. The controller will run from the last record breakpoint.

Note： When you click **PAUSE**, it will automatically produce a breakpoint. In case of power outage, it will also automatically record the breakpoint. As the picture 3-17 shows, it begins processing from the 180th line at this time. Picture 3-17 shows the display under the "goto break" status and the display shows the file name.
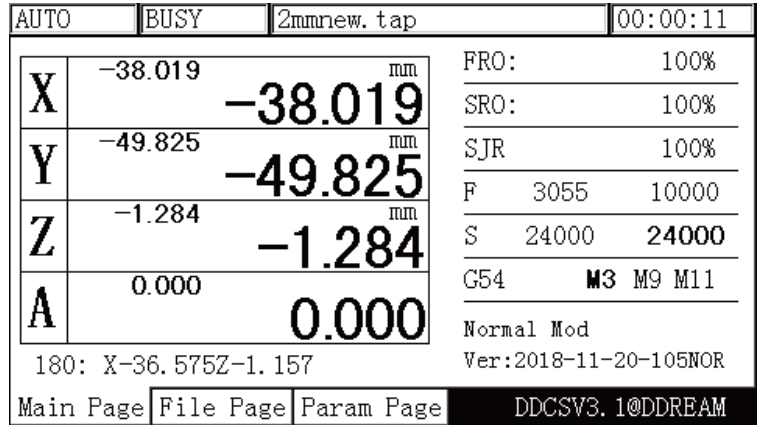


Picture 3-17　　　Breakpoint Operation

3) Start a G code file from a specific line

Click **Shift** to enter the 2nd mode. When in 2nd mode, click **START** and the Start Line Edit Box will appear. Insert the line number and click **ENTER HOME** . A syntax check will be performed and the G code will be operated from your chosen Start Line position  See pictures 3-18 to 3-20.

Picture 3-18     Edit the start line



Picture 3-19     Syntax Checking



Picture 3-20     Program will run from the chosen line

4) Pause in operation

During file processing, press the **PAUSE** key to pause the operation. The Operation Status Column will display "READY" and the Z axis will lift the tool to the defined safe height.

5) ESTOP in operation

During file processing, press the **RESET** key to ESTOP the procedure. The Operation Status Column will display "RESET" flashing. The spindle will stop.

6) Start/Stop spindle

Only when the Operation Status Column displays "READY" you can manually start or stop the spindle. Use **SPINDLE** the spindle button to switch from Start to Stop and back.

### 3.3.3 Manually position the machine

You can manually position the machine at any position. You can move Continuous, in defined Steps or with the MPG. The **Mode** button moves you through the three options:

1) Manual step of the X axis

Press **Mode** till "step" is displayed. In picture 3-21 Step parameter shows the current step rate (0.01mm).

Press the **Tab** button till SJR is highlighted and you can change the steps by **SELECT A** and **MODIFY PROBE** keys.

Press the **GOTO0** key to move the X axis negative 0.01mm，and press **X** to move the X axis 0.01mm positive. Move Y Z and A in the same way.

| STEP | READY | 2mmnew.tap | | 00:00:42 |
|---|---|---|---|---|

| | | | FRO: | 100% |
|---|---|---|---|---|
| X | 20.638 | 20.638 mm | SRO: | 100% |
| Y | −43.025 | −43.025 mm | **SJR** | 0.01 |
| Z | 3.708 | 3.708 mm | F | 0 | 25000 |
| A | 0.000 | 0.000 | S | 0 | 24000 |

G54    M5  M9 M11

Normal Mod
Ver:2018-11-20-105NOR

| Main Page | File Page | Param Page | DDCSV3.1@DDREAM |
|---|---|---|---|

Picture 3-21    STEP Mode

2) Manual continuous operation of the X axis

Click **Mode** till CONT is displayed. The feed status displays "CONT". See picture 3-22. You can now move the axis continuous with the arrow keys. Adjust the Jog speed by highlighting SJR and modify the jog speed with **SELECT A** and **MODIFY PROBE**. All other axes can be moved in the same way.

| CONT | READY | 2mmnew. tap | | 00:00:42 |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| X | 20.638 | 20.638 mm | FRO: | 80% |
| | | | SRO: | 80% |
| Y | −43.025 | −43.025 mm | SJR | 120% |
| | | | F    0 | 25000 |
| Z | 3.708 | 3.708 mm | S    0 | 24000 |
| | | | G54   M5 M9 M11 | |
| A | 0.000 | 0.000 | Normal Mod | |
| | | | Ver:2018-11-20-105NOR | |

| Main Page | File Page | Param Page | DDCSV3. 1@DDREAM |
|---|---|---|---|

Picture 3-22     Enter the manual Continuously moving mode

3) Use MPG to operate X axis

Click **Mode** till the Feed Status displays "MPG". Use the MPG to move the machine.

| MPG | READY | 2mmnew. tap | | 00:00:42 |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| X | 20.638 | 20.638 mm | FRO: | 100% |
| | | | SRO: | 100% |
| Y | −43.025 | −43.025 mm | SJR | 100% |
| | | | F    0 | 25000 |
| Z | 3.708 | 3.708 mm | S    0 | 24000 |
| | | | G54   M5 M9 M11 | |
| A | 0.000 | 0.000 | Normal Mod | |
| | | | Ver:2018-11-20-105NOR | |

| Main Page | File Page | Param Page | DDCSV3. 1@DDREAM |
|---|---|---|---|

Picture 3-23     Enter the MPG mode

### 3.3.4  Main Page Parameter adjustments

The values FRO, SRO, SRJ, F, S Coordinate system and the M codes can easily be changed

Click **Tab** till the display highlights what you want to adjust and then click **SELECT A** or **MODIFY PROBE** .

1) FRO

The FRO parameters. Under "READY" press **Tab** till FRO is highlighted (bold).

With **SELECT A** and **MODIFY PROBE** adjust the value between 0% to 300%

2) SRO

The Spindle adjustment controls the spindle's speed. Highlight SRO and use **SELECT A** and **MODIFY PROBE** to adjust the spindle speed from 0% to 200%

3) SJR

The SJR is to adjust the jog speed. In "CONT" mode you can adjust from 0% to 150%.

In "Step" mode you can adjust 0.01mm, 0.1mm, 1mm and 10mm. Use **MODIFY PROBE** and **SELECT A** to adjust and choose your value. Click on the Axes arrow keys will move the machine this distance once.

| CONT | READY | 2mmnew. tap | | 00:00:42 |
|------|-------|-------------|---|----------|
| X | 20.638 mm **20.638** | | FRO: | 80% |
| Y | −43.025 mm **−43.025** | | SRO: | 80% |
| | | | SJR | 120% |
| Z | 3.708 mm **3.708** | | F    0 | 25000 |
| | | | S    0 | 24000 |
| A | 0.000 **0.000** | | G54    M5  M9 M11 | |
| | | | Normal Mod | |
| | | | Ver:2018-11-20-105NOR | |
| Main Page | File Page | Param Page | DDCSV3. 1@DDREAM | |

Picture 3-24    SJR value adjusts to 10 under the mode of "step"

4) F Value modification

The F value adjustment the default Feed Speed. Use the **Tab** key to highlight F.

If you click **MODIFY PROBE** or **SELECT A** an Edit Window will appear Choose your desired Feed speed and confirm with Enter. See picture 3-23

| CONT | READY | 2mmnew. tap | | 00:00:42 |
|------|-------|-------------|---|----------|
| X | 20.638 mm **20.638** | | FRO: | 80% |
| Y | −43.025 mm **−43.025** | | SRO: | 80% |
| | | | SJR | 120% |
| Z | 1.006 mm **1.006** | | F    0 | 24000 |
| | | | S    0 | 24000 |
| A | 0.000 **0.000** | | G54    M5  M9 M11 | |
| | | | Normal Mod | |
| | | | Ver:2018-11-20-105NOR | |
| Main Page | File Page | Param Page | DDCSV3. 1@DDREAM | |

Picture 3-25    Enter default F modification mode

5) S Value modification

Use the **Tab** key to highlight S.  If you click **SELECT A** or **MODIFY PROBE** an Edit Window will appear
Choose your desired Feed speed and confirm with Enter.

| CONT | READY | 2mmnew. tap | | 00:00:42 |
|---|---|---|---|---|

```
        20.638                    mm     FRO:           80%
  X              20.638                  SRO:           80%
        -43.025                   mm     SJR           120%
  Y             -43.025                  F      0      24000
         1.006                    mm     S      0      24000
  Z               1.006                  G54       M5  M9  M11
         0.000                           Normal Mod
  A               0.000                  Ver:2018-11-20-105NOR

  Main Page│File Page│Param Page       DDCSV3.1@DDREAM
```

Picture 3-26      Enter the status of modifying default S value

6) Select G coordinate system

Under "READY", press the **Tab** key till the Coordinate System is highlighted. It will display G54, ….G59 or MACH (stands for Machine Coordinates).

Use **MODIFY PROBE** and **SELECT A** to choose your desired Coordinate System. Position values will be displayed for X, Y, Z and A. The Enter key confirms the Coordinate System you chose.

### 3.3.5 The 2nd Mode

The 2nd key opens several functions.

In READY mode, the Operation Window displays "Normal Mode". Press **Shift** to enter the 2nd mode. The Operation Window will show: X-:gotoz Y-:zero Z-: home A-:probe start:goto break and the Feed Status column displays "2nd mode". See picture 3-27. You can now make your choice which may open new options accordingly.



Picture 3-27     Enter the "2nd function" Mode

Tip

Lets say you want to choose the center of your material as the X and Y Zero position.Move the machine with the arrow keys to the desired XY position. Alternatively use the MPG to do this.

Now press the **Shift** key and the Operation Window will show: X-:gotoz, Y-:zero, Z-: home, A-:probe, start:goto break .

Press the **Shift** key again and the coordinates of X Y and Z will show 0.000
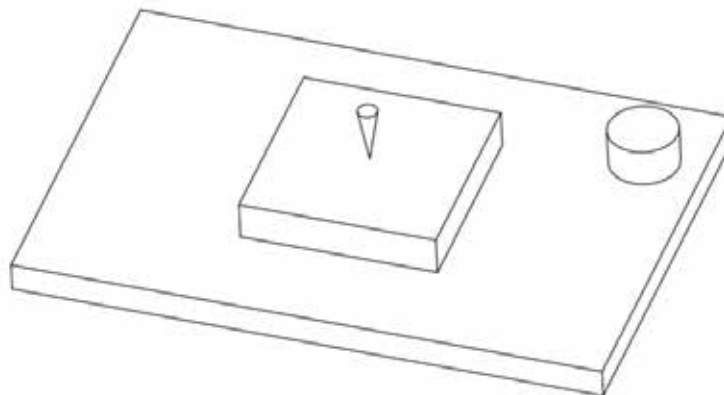


Picture 3-28     The tool tip over the work piece center

Tip:

Do not forget to probe again after a tool change

# 3.4 Parameter setting

The DDCS stores the machine settings in a parameter file called setting.set. This file is a basic text file. You can modify all the parameters in the Parameter Page but also within the setting.set file. Originally the DDCS V3.1 will be loaded with the default setting and you can change the settings in the Parameter Page (or in the text file setting.set) to adjust for your machine.

Tip:

Back up your setting.set file… just in case.

## 3.4.1 Parameter loading method

Copy the parameter file to the USB drive and insert it into the USB interface one the controller. As the Picture 3-28 shows,press the key [RESET] in the main page to ensure that the status column can display "READY" and then press the key [PAGE R] to switch to the file management page. As the Picture 3-30 shows, select the parameter file Uservar.set and then press the Enter key [ENTER HOME] to load the parameter file. It probably needs to wait for 1-5s and the "READY" of status column will automatically change into "reset" with flashing, which indicates the parameter loads successfully.

Picture 3-29    Ensure the status column is the status of "READY"

Picture 3-30    Selct the uservar.set file and enter

### 3.4.2  Set the Parameters in the Parameter setting Page

In the main page, ensure the operation status is "READY" and press the key **PAGE R** two times continuously to enter the Parameter Page. As the picture 3-31 shows, in the parameter configuration page, pressing the key **GOTO0** and **X** is to turn the page forward and backward. Pressing the key **Y** and **ZERO** is to select the current parameter items up and down. When you select the parameters which are required to modify, please press the key **ENTER HOME** to enter the current parameter modification mode. At this time, it will pop up a small dialog box of the modified value, which is the same with the other parameters.Pressing the key **GOTO0** and **X** is to adjust the current bit. Pressing the key **Y** and **ZERO** is to adjust the value of the current bit. After finishing modification, please press the key **ENTER HOME** to return to the parameter select. After finishing modifying the parameter, it needs to press **PAGE R** to return to the homepage, thus loading the parameter and making the parameter takes effect.



| No. | Param Name | Value | Unit |
|-----|------------|-------|------|
| CONT | READY | 2mmnew.tap | 00:00:00 |
| --- | [Top parameters] | ------------- | ------ |
| 5 | minimum log radius of 4axis machinir | 5.000 | mm |
| 6 | A axis rotate reference axis | not rotate | |
| 104 | A axis optimal path when G0 run | No | |
| --- | [Motor parameters] | ------------- | ------ |
| 33 | Motor start speed | 150.000 | mm/min |
| 34 | X axis pulse equivalency | 1280.000 | pulse/mm |
| 35 | Y axis pulse equivalency | 1280.000 | pulse/mm |
| 36 | Z axis pulse equivalency | 3200.000 | pulse/mm |
| 38 | A axis pulse equivalency | 53.333 | |
| 39 | A axis pulse unit | pulse/deg | |
| 40 | AB axis Selection | A axis | |
| 390 | X axis DIR signal Electric Level | Low | |

Main Page | File Page | Param Page | DDCSV3.1@DDREAM

Picture 3-31      Enter the parameter configuration page

### 3.4.3  The detailed definition of parameters

The parameter file can be edited, but it needs to follow the definite standards, the standards are as follows:

a、One line can only be edited one parameter.

b、The parameter format is  #/parameter mark/value/Unit. Among them, # must be the first character of each line.# should closely be followed by the parameter mark and the following mark will be followed by the actual value.

c、After the parameter has assignment and equation, the part of parameter interpretation can have any format without constraint.

d、Each parameter is regulated with assignment scope. Please do the assignment in strict accordance with the assignment scope.

e、Each parameter is set with default value in advance. Please use the setting value of default parameter under the situation of not understanding the actual function of this parameter.

1) Configuration parameter of motor (16 in total)

| Para. Mark | Parameter definition | Default value | Parameter Unit | Parameter Scope | Notes |
|---|---|---|---|---|---|
| #33 | speed of motor start running | 50 | mm/min | 0~200 | Speed ofmotor start running's first step |
| #34 | Pulse /mm X axis | 640 | Pulse/mm | 100~10000 | |
| #35 | Pulse /mm Y axis | 640 | Pulse/mm | 100~10000 | |
| #36 | Pulse /mm Z axis | 640 | Pulse/mm | 100~10000 | |
| #38 | Pulse /mm A axis | 640 | Pulse/degree | 100~10000 | |
| #390 | level of X axis DIR signal | 0 | BOOL | 1/0 | 1=high,0=low |
| #391 | level of Y axis DIR signal | 0 | BOOL | 1/0 | |
| #392 | level of Z axis DIR signal | 1 | BOOL | 1/0 | |
| #393 | level of A axis DIR signal | 0 | BOOL | 1/0 | |
| #416 | time between DIR & pulse | 300 | ns | 0~1000 | Differential between direction and pulse |
| #418 | level of X axis pulse signal | 0 | BOOL | 1/0 | axis pulse signal of X,Y,Z,A as well as the Pulse signal value when there is no pulse. |
| #419 | level of Y axis pulse signal | 0 | BOOL | 1/0 | |
| #420 | level of Z axis pulse signal | 1 | BOOL | 1/0 | |
| #421 | level of A axis pulse signal | 1 | BOOL | 1/0 | |

2) Parameter of manual control motion(16 in total)

| Para. Mark | Parameter definition | Default value | Parameter Unit | Parameter Scope | Notes |
|---|---|---|---|---|---|
| #41 | max speed of X in M_Ctrl mode | 16000 | mm/min | 0~20000 | The parameter value of this group has set a upper limit for the SJR |
| #42 | max speed of Y in M_Ctrl mode | 16000 | mm/min | 0~20000 | |
| #43 | max speed of Z in M_Ctrl mode | 16000 | mm/min | 0~20000 | |
| #44 | max speed of A in M_Ctrl mode | 16000 | degree/min | 0~20000 | |
| #45 | start Acceleration of X in M_Ctrl mode | 600 | mm/s$^2$ | 0~2000 | 4 axis of X,Y,Z,A manual start acceleration |
| #46 | start Acceleration of Y in M_Ctrl mode | 600 | mm/s$^2$ | 0~2000 | |
| #47 | start Acceleration of Z in M_Ctrl mode | 600 | mm/s$^2$ | 0~2000 | |
| #48 | start Acceleration of A in M_Ctrl mode | 600 | degree/s$^2$ | 0~2000 | |
| #100 | manual control speed of X axis | 8000 | mm/min | 0~20000 | Panel keys operation the X,Y,Z,A axis Continuously move speed |
| #101 | manual control speed of Y axis | 8000 | mm/min | 0~20000 | |
| #102 | manual control speed of Z axis | 4000 | mm/min | 0~20000 | |
| #103 | manual control speed of A axis | 12000 | degree/min | 0~20000 | |
| #263 | stop Acceleration of X in M_Ctrl mode | 1200 | mm/s$^2$ | 0~2000 | 4 axis of X,Y,Z,Amanually stop acceleration, the stop acceleration can be set appropriately larger |
| #264 | stop Acceleration of Y in M_Ctrl mode | 1200 | mm/s$^2$ | 0~2000 | |
| #265 | stop Acceleration of Z in M_Ctrl mode | 1200 | mm/s$^2$ | 0~2000 | |
| #266 | stop Acceleration of A in M_Ctrl mode | 1200 | degree/s$^2$ | 0~2000 | |

3) Automatic processing parameter(11 in total)

| Para. Mark | Parameter definition | Default value | Parameter Unit | Parameter Scope | Notes |
|---|---|---|---|---|---|
| #15 | Speed selection for Gcode file | 1 | BOOL | 1/0 | 0:set by G code; 1:use default speed |
| #76 | Default operation speed | 1500 | mm/min | 0~20000 | |
| #77 | Max operation speed | 8000 | mm/min | 0~30000 | |
| #78 | Max speed of Z+ | 3000 | mm/min | 0~20000 | |
| #79 | Max speed of Z- | 3000 | mm/min | 0~20000 | |
| #80 | Speed of G0 | 5000 | mm/min | 0~20000 | |
| #82 | Safe height of Z axis | 5 | mm | 0~500 | Retract height of Z |
| #89 | Z retract distance | 5 | mm | 0~99 | This value cannot be negative value |
| #99 | Operation acceleration | 500 | mm/min$^2$ | 0~2000 | |
| #435 | Max speed of X axis | 8000 | mm/min | 0~20000 | |
| #436 | Max speed of Y axis | 8000 | mm/min | 0~20000 | |

4) Parameter of coordinate system(1 in total)

| Para. Mark | Parameter definition | Default value | Parameter Unit | Parameter Scope | Notes |
|---|---|---|---|---|---|
| #16 | Current coordinate system | 1 | BOOL | 0~6 | 0~5: G54~G59, 6: Machine |

5) Parameter of spindle(8 in total)

| Para. Mark | Parameter definition | Default value | Parameter Unit | Parameter Scope | Notes |
|---|---|---|---|---|---|
| #98 | Max spindle speed | 24000 | rpm | 0~50000 | Spindle PWM or voltage signal full range is corresponding to speed value |
| #220 | Spindle speed selection | 1 | BOOL | 1/0 | 0: G code,1:Default |
| #221 | Default spindle speed | 12000 | rpm | 0~50000 | |
| #222 | Activate M3/M5 | 1 | BOOL | 1/0 | 1: Yes; 0:No |
| #224 | Delay time of M3/M5 | 3 | s | 0~100 | Spare enough time for spindle response |
| #227 | active level of spindle | 1 | BOOL | 1/0 | Corresponding output electrical level when the spindle starting |
| #422 | definition of PWM level | 0 | BOOL | 1/0 | The output voltage value is 0,the spindle is 0,voltage is 10V,speed is full. |
| #433 | Acceleration time of PWM | 1111 | Time equivalent | 1~65535 | The acceleration time to full speed is #433*0.0005s |

6) IO output parameter(5 in total)

| Para. Mark | Parameter definition | Default value | Parameter Unit | Parameter Scope | Notes |
|---|---|---|---|---|---|
| #223 | Activate M code (M8/M9,M10/M11) | 1 | BOOL | 1/0 | 1: Yes; 0:No |
| #225 | Delay time of M8/M9 | 1 | S | 1~20 | Delay time after M8/M9/M10/M11 code |
| #226 | Delay time of M10/M11 | 1 | S | 1~20 | |
| #228 | Active level of M8/M9 | 1 | BOOL | 1/0 | 1: Yes; 0:No |
| #229 | Active level of M10/M11 | 1 | BOOL | 1/0 | 1: Yes; 0:No |

7) 0-point function parameter(20 in total)

| Para. Mark | Parameter definition | Default value | Parameter Unit | Parameter Scope | Notes |
|---|---|---|---|---|---|
| #52 | Enable X home | 1 | BOOL | 1/0 | 1: Yes; 0:No |
| #53 | Enable Y home | 1 | BOOL | 1/0 | |
| #54 | Enable of Z home | 1 | BOOL | 1/0 | |
| #55 | Enable of A home | 1 | BOOL | 1/0 | |
| #56 | Home speed of X | 8000 | mm/s | 1~20000 | |
| #57 | Home speed of Y | 8000 | mm/s | 1~20000 | |
| #58 | Home speed of Z | 8000 | mm/s | 1~20000 | |
| #59 | Home speed of A | 8000 | mm/s | 1~20000 | |
| #60 | Signal Level X Home | 0 | BOOL | 1/0 | 1: High; 0:Low |
| #61 | Signal Level Y Home | 0 | BOOL | 1/0 | |
| #62 | Signal Level Z Home | 0 | BOOL | 1/0 | |
| #63 | Signal Level A Home | 0 | BOOL | 1/0 | |
| #64 | direction of X home | 0 | BOOL | 1/0 | 0:reverse direction home(--) 1:forward direction home(++) |
| #65 | direction of Y home | 0 | BOOL | 1/0 | |
| #66 | direction of Z home | 0 | BOOL | 1/0 | |
| #67 | direction of A home | 0 | BOOL | 1/0 | |
| #83 | back off distance of X after home | 10 | mm | 0~1000 | After homing, each axis needs to move away from the home switch for a certain distance. The parameter of this group is this back off distance |
| #84 | back off distance of Y after home | 10 | mm | 0~1000 | |
| #85 | back off distance of Z after home | 10 | mm | 0~1000 | |
| #86 | back off distance of A after home | 10 | mm | 0~1000 | |

8) Parameter of Probe function (8 in total)

| Para. Mark | Parameter definition | Default value | Parameter Unit | Parameter Scope | Notes |
|---|---|---|---|---|---|
| #68 | enable  Probe | 1 | BOOL | 1/0 | 0：disable 1：enable |
| #69 | thickness of tool sensor | 20 | mm | 0~200 | |
| #70 | level of probe signal | 0 | BOOL | 1/0 | 1: High; 0:Low active |
| #71 | initial tool's position | 0 | BOOL | 1/0 | 0: current position; 1:fixed position mode |
| #72 | initial X axis in fixed mode | 0 | mm | 0-9999 | Tools position X coordinate in the Mach(ine) coordinate system |
| #73 | initial Y axis in fixed mode | 0 | mm | 0-9999 | Tools position Y coordinate in the Mach(ine) coordinate system |
| #74 | initial Z axis in fixed mode | 0 | mm | 0-9999 | Height of Z axis before the XY move under the Mach(ine) coordinate system |
| #75 | Back off distance after probing | 10 | mm | 0~200 | |

9) Parameter of hard limit funition(16 in total)

| Para. Mark | Parameter definition | Default value | Parameter Unit | Parameter Scope | Notes |
|---|---|---|---|---|---|
| #400 | enable X-- limit | 1 | BOOL | 1/0 | 0：Disable 1：Enable |
| #401 | enable Y-- limit | 1 | BOOL | 1/0 | 0：Disable 1：Enable |
| #402 | Enable Z-- limit | 1 | BOOL | 1/0 | 0：Disable 1：Enable |
| #403 | enable A-- limit | 1 | BOOL | 1/0 | 0：Disable 1：Enable |
| #404 | enable X++ limit | 1 | BOOL | 1/0 | 0：Disable 1：Enable |
| #405 | enable Y++ limit | 1 | BOOL | 1/0 | 0：Disable 1：Enable |
| #406 | enable Z++ limit | 1 | BOOL | 1/0 | 0：Disable 1：Enable |
| #407 | enable A++ limit | 1 | BOOL | 1/0 | 0：Disable 1：Enable |
| #408 | active level X-- limit | 0 | BOOL | 1/0 | 1: High; 0:Low |
| #409 | active level Y-- limit | 0 | BOOL | 1/0 | 1: High; 0:Low |
| #410 | active level Z-- limit | 0 | BOOL | 1/0 | 1: High; 0:Low |
| #411 | active level A-- limit | 0 | BOOL | 1/0 | 1: High; 0:Low |
| #412 | active level X++ limit | 0 | BOOL | 1/0 | 1: High; 0:Low |
| #413 | active level Y++ limit | 0 | BOOL | 1/0 | 1: High; 0:Low |
| #414 | active level Z++ limit | 0 | BOOL | 1/0 | 1: High; 0:Low |
| #415 | active level A++ limit | 0 | BOOL | 1/0 | 1: High; 0:Low |

10) Parameter of soft limit function (9 in total)

| Para. Mark | Parameter definition | Default value | Parameter Unit | Parameter Scope | Notes |
|---|---|---|---|---|---|
| #374 | enable Soft Limit | 0 | BOOL | 1/0 | 0:Disable, 1:Enable |
| #375 | value X--  Soft Limit | -400 | BOOL | -2000~0 | The set value will trigger the limit signal. The limit values refer to the machine coordinates, not the work piece coordinate. |
| #376 | value Y--  Soft Limit | -400 | BOOL | -2000~0 | |
| #377 | value Z--  Soft Limit | -400 | BOOL | -2000~0 | |
| #378 | value A--  Soft Limit | -400 | BOOL | -2000~0 | |
| #379 | value X++  Soft Limit | 400 | BOOL | 0~2000 | The set value will trigger the limit signal. The limit values refer to the machine coordinates, not the work piece coordinate. |
| #380 | value Y++  Soft Limit | 400 | BOOL | 0~2000 | |
| #381 | value Z++  Soft Limit | 400 | BOOL | 0~2000 | |
| #382 | value A++  Soft Limit | 400 | BOOL | 0~2000 | |

11) Parameter of MPG function(5 in total)

| Para. Mark | Parameter definition | Default value | Parameter Unit | Parameter Scope | Notes |
|---|---|---|---|---|---|
| #428 | Enable MPG RESET | 1 | BOOL | 1/0 | 0: Disable,1: Enable |
| #429 | Level of MPG RESET | 0 | BOOL | 1/0 | 1: High; 0:Low |
| #430 | Type of MPG port | 1 | BOOL | 1/0 | 0:UART,1: Standard |
| #431 | Pulse of MPG | 0 | BOOL | 1/0 | 0: 100 steps /cycle,1: 24 steps /cycle |
| #432 | IO signal level of MPG | 0 | BOOL | 1/0 | 1: High; 0:Low |

12) Parameter extended functions (7 in total)

| Para. Mark | Parameter definition | Default value | Parameter Unit | Parameter Scope | Notes |
|---|---|---|---|---|---|
| #423 | External RESET | 1 | BOOL | 1/0 | 1: High; 0:Low |
| #424 | Level External RESET | 0 | BOOL | 1/0 | 1: High; 0:Low |
| #425 | Enable of External Key | 1 | BOOL | 1/0 | 0: Disable,1: Enable |
| #426 | Level of External Key 1 | 0 | BOOL | 1/0 | 1: High; 0:Low |
| #427 | Level of External Key 2 | 0 | BOOL | 1/0 | 1: High; 0:Low |
| #446 | Function of External Key 1 | 0 | BOOL | 1/0 | 0:Start,1:Find Center |
| #447 | Function of External Key 2 | 0 | BOOL | 1/0 | 0:Pause,1: Zero |

13) Parameter of Backlash (9 in total)

| Para. Mark | Parameter definition | Default value | Parameter Unit | Parameter Scope | Notes |
|---|---|---|---|---|---|
| #437 | Enable of X backlash | 0 | BOOL | 1/0 | 0:Disable,1:Enable |
| #438 | Enable of Y backlash | 0 | BOOL | 1/0 | |
| #439 | Enable of Z backlash | 0 | BOOL | 1/0 | |
| #440 | Enable of A backlash | 0 | BOOL | 1/0 | |
| #441 | Distance of X axis backlash | 0 | mm | 0~200 | Set the backlash return as you need for each axis. Tip: experiment with the settings and check the results |
| #442 | Distance of Y axis backlash | 0 | mm | 0~200 | |
| #443 | Distance of Z axis backlash | 0 | mm | 0~200 | |
| #444 | Distance of A axis backlash | 0 | mm | 0~200 | |
| #445 | Speed of backlash | 0 | mm/min | 0~2000 | |

14 ) Other parameters(6 in total)

| Para. Mark | Parameter definition | Default value | Parameter Unit | Parameter Scope | Notes |
|---|---|---|---|---|---|
| #1 | Language | 1 | BOOL | 1/0 | 0: English,1: Chinese |
| #2 | Interface response speed while processing | 400 | | 400-10000 | Note: For general G-code file, the parameter can be set as 400. If the file has many small segments, adjust the parameter to be larger. |
| #495 | circle of interpolation | 0.002 | s | 0.002-0.01 | circle of interpolation |
| #250 | enable of draw tool road | 1 | BOOL | 1/0 | 0:disable 1: enable |
| #253 | mode of draw | 0 | BOOL | 1/0 | 0:statue mode 1:line mode |
| #499 | user access key | 888888 | N/A | 0-999999 | |

Mode of draw tool road: As for the plane line, such as the PCB engraving or the color plates lettering, please adopt the line pattern. As for the plane embossment, please adopt the statue pattern.

## 3.5 Firmware upgrade

Decompress the upgraded file into the USB-disk,and save it to the root directory of the U-disk.

Pls note the upgraded file should be in the Root-directory in the U-disk,as bellow:
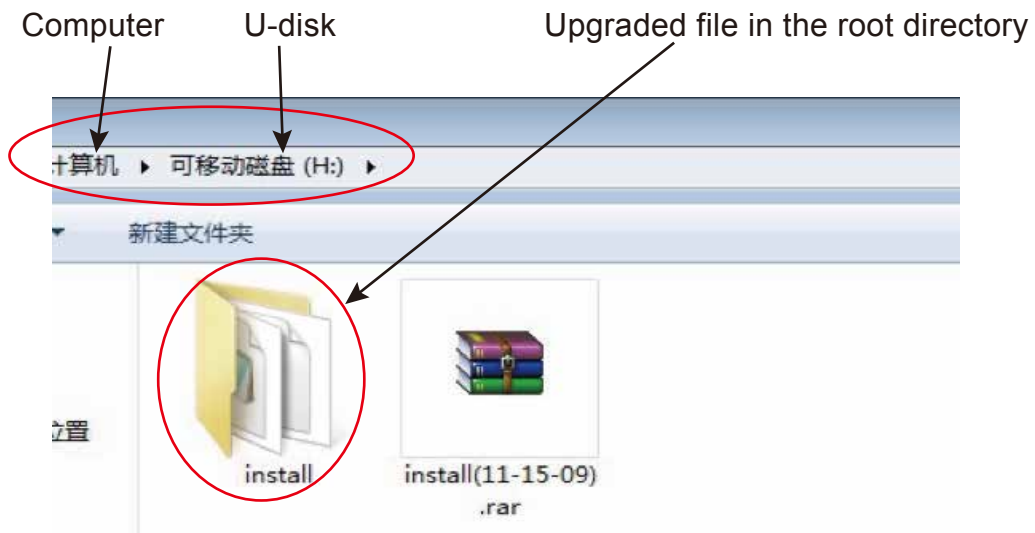


Picture 3-32    Position of Upgraded file

As the picture 3-33 shows, after decompressing the file into the USB's root directory, the file path is X://INSTALL/. The upgrade files are in this folder, it total 6 files. There is ch (Chinese) and eng (English). Motion.out is the main program. The pause.nc and systemLib.nc are the extended code files. Setting is the setting file.
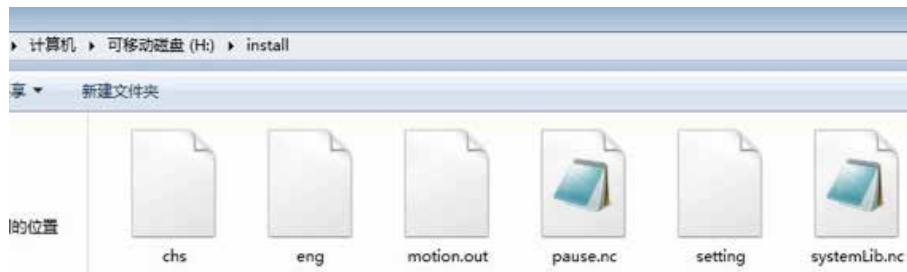


Picture 3-33    upgrade files

Important

When upgrading, the entire configuration will be replaced. If you need to keep your Settings, delete the setting.set file in the install folder. Your original Settings will then not be changed.

The install folder must appear as in pic 3-32 or it can not be upgraded. If the folder name is not correct (for example install instead of install), or the upgraded file is not in the root directory of the U-dks,the upgrade can not be performed. See as picture 3-34 and 3-35.
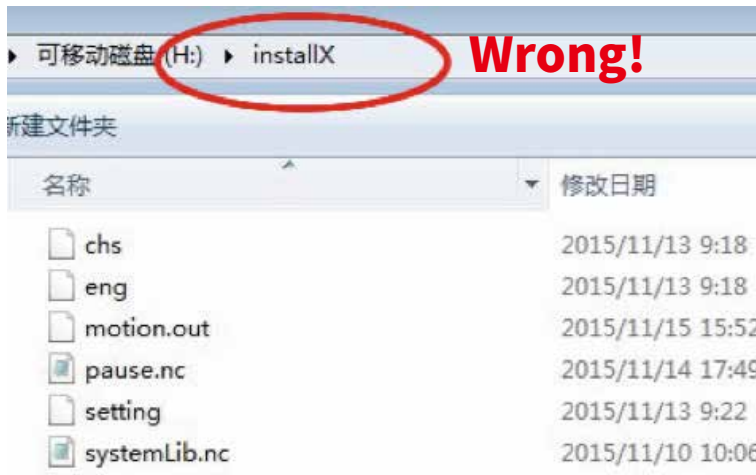
Picture 3-34    If the folder name is not correct, installation can not be processed
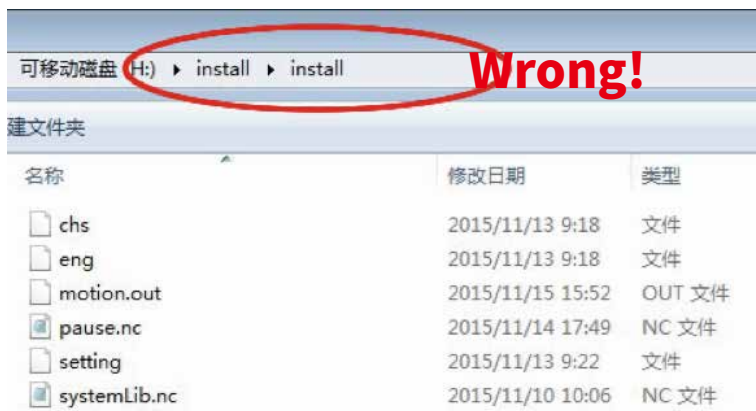


Picture 3-35    Multilevel directory can not work

Begin to upgrade when USB is inserted into the controller.

Shut Down the controller,after 10 seconds,insert the U-disk into the controller.Then power on the controller.The controller can find the upgraded file itself and process the upgrading.The update will be performed automatically and the screen will not change for about 30 seconds. Please be patient.

When the upgrading is finished,on the main page,it will shows the upgrading version No.It shows as below:



Picture 3-36    Version No. of the upgraded file

Picture 3-37     Screen displayed during upgrade process (approx 30 seconds)

After the upgrade, the DDCS can be used right away.

# 3  G code and M Code List

| G Code | Name | Definition | Use case |
|---|---|---|---|
| G0 | Quick positioning | Operate to the assigned position with the highest speed set by the system | G0 X..Y.. Z.. |
| G1 | Spindle straightaway cut | Operate to the assigned position according to the F value assigned by the system or the file | G1 X..Y.. Z.. |
| G2 | Spindle cut along the circle | Arc cutting machining clockwise | Radius method:G2X..Y..Z..R..F.. Circle center method : G2X..Y ..Z..I..J..K..F |
| G3 | Spindle cut inversing the circle | Arc cutting machining clockwise | Radius method:G2X..Y..Z..R..F.. Circle center method : G2X..Y ..Z..I..J..K..F |
| G17 | XY plane select | Interpolation plane selects the XY plane | G17 |
| G18 | ZX plane select | Interpolation plane selects the YZ plane | G18 |
| G19 | YZ plane select | Interpolation plane selects the YZ plane | G19 |
| G28 | Home | | |
| G31 | Probe | | |
| G54 | G54 coordinate system | Select G54 work piece coordinate system | G54 |
| G55 | G55 coordinate system | Select G55 work piece coordinate system | G55 |
| G56 | G56 coordinate system | Select G56 work piece coordinate system | G56 |
| G57 | G57 coordinate system | Select G57 work piece coordinate system | |
| G58 | G58 coordinate system | Select G58 work piece coordinate system | |
| G59 | G59 coordinate system | Select G59 work piece coordinate system | |
| G81 | Drill hole code | | G81 X..Y..Z..R..F.. |
| G82 | Drill hole code | | G82 X..Y..Z..R..P..F.. |
| G83 | Circulation Drill Hole Code | | G83 X..Y..Z..R..Q..F.. |
| G90 | Absolute size Mode | | |
| G91 | Increment size Mode | | |
| G98 | Invok sub-program | G98 should work with G99.G98 invok a sub-program from main program. | |
| G99 | Back to main program | G99 should with with G98.G99 set back to the main program after G98 finish its job. | |

| M Code | Name | Definition |
|---|---|---|
| M3 | Spindle rotates forward | The set of output control signal for spindle rotates forward is valid |
| M5 | Spindle stop | The set of output control signal for spindle rotates forward is invalid |
| M8 | Start of water -cooling | Arc cutting machining clocThe set of water-cooling output control signal is valid |
| M9 | Stop of water- cooling | The set of water-cooling output control signal is invalid |
| M10 | Start of lubricating oil | Interpolation plane seThe set of lubricating oil output control is valid |
| M11 | Close of the lubricating oil | The set of lubricating oil output control is invalid |