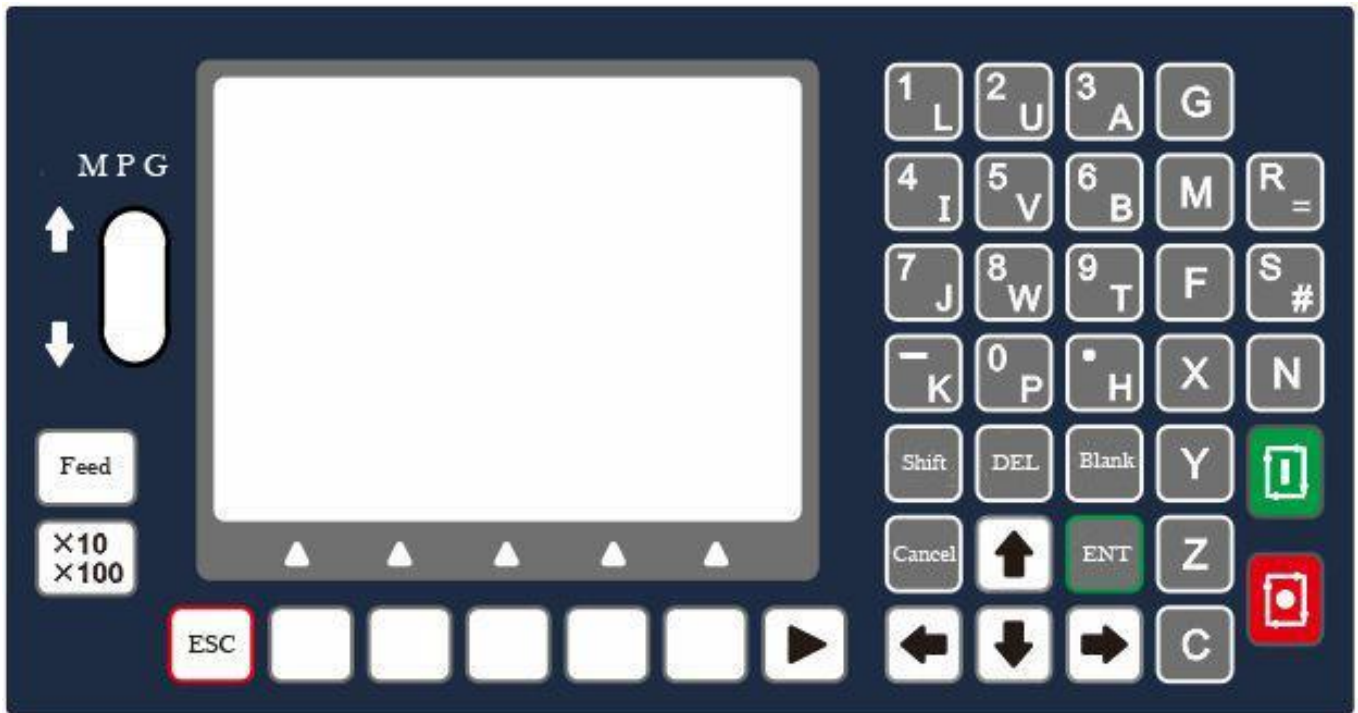# CM45L Instruction Manual

1. Product Introduction

TC55H is an upgrading version of TC55. It can control 4 feeding axis, 1 analog spindle. It is equipped with 16 input port and 8 output port, supporting importing files from USB stick.

2. Technical Specifications

Minimum data unit 0.001 mm

Maximum data size ± 99999.999mm

Maximum Speed: 9000mm/min (pulse is 0.001mm)

Maximum pulse output frequency 150KHz

Axis 1-4 (X,Y, Z,C)

X,Y,Z,C axis can conduct linear interpolation, X,Y can do circular interpolation. Electric Gear: numerator :1-99999 denominator: 1-99999

USB: Importing program and boot

picture Isolated I/O port

Maximum Program Line: 1000

Maximum Program: 99

RAM: 128M

External Manual Operation: motor clockwise and counter clockwise spinning, start, pause, alert and stop

G code and M code

One panel MPG

3.5 inch color LCD, pixel 320*240

Analog Spindle Output: 1 0-10v analog spindle

Definition of external Switch

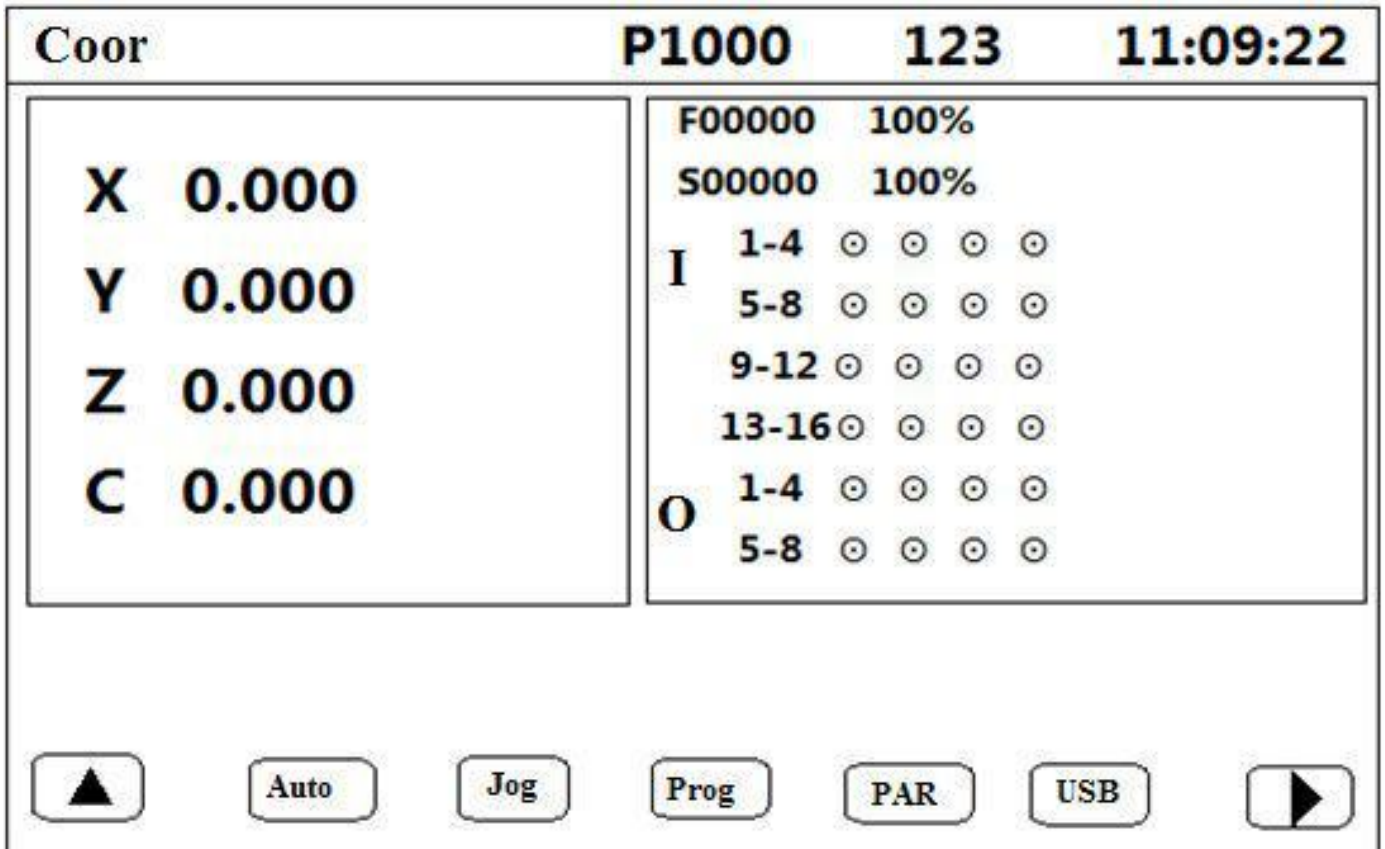Please Contact us if you need to change the boot picture before buying

■ Gode Table

G code	Fuction	G code	Function
G00	Quick Positioning	G26	Circulation
G01	linear interpolation	G27	Judge the jump, match the condition jump
G02	CW circular interpolation	G28	Judge the jump, not match the condition jump
G03	CCW circular interpolation	G60	Cancel G64, exact path mode
G04	Delay (Unit: Second)	G64	Cancel G60, continuous path mode
G20	Subroutine call	G74	Back to the mechanical zero
G22	Subroutine start	G90	Absolute programming
G24	Subroutine end	G91	Increment programming
G25	Absolute jump	G92	Set the coordinates

M Code	Function	M Code	Function
M00	Stop	M05	Spindle stop
M02	Stop Auto working	M48	Clear the count of he workpiece
M03	Spindle CCW	M47	The worke piece +1
M04	Spindle CW	M51……M66	Output On/Off，need to set the Output port as IO setting

Operation

1. Main Interface

Coor		P1000	123	11:09:22

```
X  0.000        F00000   100%
                S00000   100%
Y  0.000          1-4  ⊙ ⊙ ⊙ ⊙
                I 5-8  ⊙ ⊙ ⊙ ⊙
Z  0.000          9-12 ⊙ ⊙ ⊙ ⊙
                  13-16⊙ ⊙ ⊙ ⊙
C  0.000        O 1-4  ⊙ ⊙ ⊙ ⊙
                  5-8  ⊙ ⊙ ⊙ ⊙
```

[▲]   [Auto]   [Jog]   [Prog]   [PAR]   [USB]   [▶]

This is the interface showing after booting without boot picture. It shows the coordinates of each axis, F speed and rate, S speed and rate, as well as condition of input and output port. P1000 means the program currently running; 123 means the input method. You can get into the AUTO, JOG, PROG, PAR, USB as well as password interface from here.

2.Auto

```
Auto                          P1000    123        00:05:21

                                  F00000              100%
     X 0.000                      S00000              100%

                                        1-4      ⊙ ⊙ ⊙ ⊙
     Y 0.000                    I
                                        5-8      ⊙ ⊙ ⊙ ⊙

                                        9-12     ⊙ ⊙ ⊙ ⊙
     Z 0.000
                                       13-16     ⊙ ⊙ ⊙ ⊙

                                        1-4      ⊙ ⊙ ⊙ ⊙
     C 0.000                    O
                                        5-9      ⊙ ⊙ ⊙ ⊙




     ▲       Step      Edit
```

In Auto Interface, Press start to run the last read program, Press Pause to Stop.

2.1 Step

Positive display means consecutive operation. Negative display means operate command by command. When it is negative display, press Start once, one program line will be executed.

3.4.2 Edit

4/4   No Mistake!

N001 G00 X100.988 Y211.456 Z988

N002 G01 X122.998 Y879.112 Z666.987 F122

N003 G01 X500

|

▲   Top   BTM   Test   Save   Auto

● Press Enter to insert new line.

● Long press DEL to delete a line.

● Press←→↑↓to move the cursor

● Top: To the fist line

● BTM: to the last line

● Test: See if there are any mistake

● Save: Save program

● Auto: Into Auto Interface.

3. Jog

JOG	X1		P1000		123	14:15:22

```
X    0.000          F00000   100%
                    S00000   100%
Y    0.000             1-4     ⊙ ⊙ ⊙ ⊙
                    I  5-8     ⊙ ⊙ ⊙ ⊙
Z    0.000             9-12    ⊙ ⊙ ⊙ ⊙
                       13-16   ⊙ ⊙ ⊙ ⊙
C    0.000             1-4     ⊙ ⊙ ⊙ ⊙
                    O  5-8     ⊙ ⊙ ⊙ ⊙


   ⊙ Output 1      ⊙ Output 3      ⊙ Output 5      ⊙ Output 7
   ⊙ Output 2      ⊙ Output 4      ⊙ Output 6      ⊙ Output 8

   ▲      Speed      MPG      BPZ      ALL 0      BMZ
```

- Press X, Y, Z and C to choose relevant axis.

- S for feeding rate gaining, N for feeding rate decreasing. (10%-150%)

- G for spindle rate gaining, M for spindle rate decreasing. (10%-150%)

- Press **Shift** to change output port, press **Enter** to change from ON or OFF.

- Press ← and → for consecutive running.

- Press ↑ and ↓ for jogging, define the jog distance in PAR-Ctrl-Jog+Distance; define jog speed in PAR-Speed-Jog.

3.1 Speed

```
[ Speed ]
```

Negative display means manual high speed, positive display means manual

low speed. Press ← and → for consecutive running.

3.2 MPG

Press **MPG**, then move the wheel up, the axis chosen move positively, move the wheel down, the chosen axis move negatively. Press **X10X100** to change the cardinal number which shown on the top of the screen.

Status	Cardinal Number
X1	0.001mm
X10	0.01mm
X100	0.1mm

3.3 BPZ

Press this key the chosen axis go back to reference point at highest speed. Define the highest speed in Parameters-Speed.

3.4 All 0

Press this key the chosen axis go back to reference point at highest speed. Define the highest speed in Parameters-Speed. F is the combination speed of all axis.

3.5 BMZ

Return to machine zero. The chosen axis will move at BMZ High Speed to go back to machine zero, then touch the switch and move at BMZ Low Speed, finally stop on the switch. In order to use this function, the X 0/Y 0/Z 0/C 0 has to be set as "On" in Parameters-Ctrl; Set BMZ High and BMZ Low in Parameters-Speed; Set the direction in Parameters-Ctrl-X BMZ Dir

4. PAR

4.1 Ctrl

Control parameters setting area, Long press ↑ and ↓ to change page.
- X/Y/Z/C Numerator: Electric gear ratio (1-99999)
- X/Y/Z/C Denominator: Electric gear ratio(1-99999)
- X/Y/Z/C Reference:In manual operation, long press X/Y/Z/C to clear the coordinates and show this value; or in machine zero, after hit the switch, it will show this value.
- X/Y/Z/C Backlash: Backlash to make it more precise
- X/Y/Z/C Boot Zero: 0 means the axis will not go back to machine zero after

- ☐ X/Y/Z/C BMZ Dir: 0 means the axis go back to machine zero towards negative direction; 1 means the axis go back to machine zero towards positive direction
- ● Speed+Time(ms): time use for motor to reach F speed
- ● Jog+Distance: in manual operation, increment for jogging. Unit of it is depended on electric gear ratio.
- ● Language: English (0)or Chinese(1)

4.1.1 Setting of Electronic Gear Ratio

Setting the electronic gear is to set different data unit for different machines. Different axis of the same machine can be set based on different unit. For example, axis A can be set as mm, axis B can be set as angle, and axis C can be set as round.

How to set the numerator and denominator of electronic gear ratio: Pulse needed for the motor to turn one round to the same direction Distance moved when the motor turn one round to the same direction(μm)

Numerator and denominator both should be integer between 1 and 99999.

Ex. 1 Screw Transmission

Stepper motor stepping is 5000, or servo motor 5000 pulse/round, screw pitch is 6mm, reduction ratio is 1:1, then,

$5000 \rightarrow 5$

$6*1000*1.0 \rightarrow 6$

Ex. 2 Rack and Pinion

Stepper motor stepping is 6000, or servo motor 6000 pulse/round, gear teeth number is 20, m=p/π=2, then 6000 →1→107→107

$1000*20*2*3.14159265 \rightarrow 20.943951 \rightarrow 2241.00276 \rightarrow 2241$

Ex. 3 Rotary Angle

Stepper motor stepping is 5000, or servo motor 5000 pulse/round, reduction ratio is 1:30, then, $5000*30 \rightarrow$ 5 $360*1000 \rightarrow 12$

4.2 Speed

- ● X/Y/Z/C Highest: The highest speed of x axis motor. When the system is operating, speed will not exceed this number no matter what F you set.

- Start(mm/min)Speed during Spd+Time

- Man High: Manual high speed

- Man Low: Manual low speed

- BMZ High: Go to machine zero at high speed.

- BMZ low: Go back to machine zero first at high speed, through zero switch and move back at low speed. Finally slider will stop on the switch.

- BMZ Mode: two modes to go back to machine zero, trough switch or not. Through switch(0): slider will stop on switch. Not trough switch(1): Slider will stop before the switch.

- S High Speed: The highest speed of spindle

4.3 Input

This function unable user to set various kind of switch easily. Define the I/O port according following form.
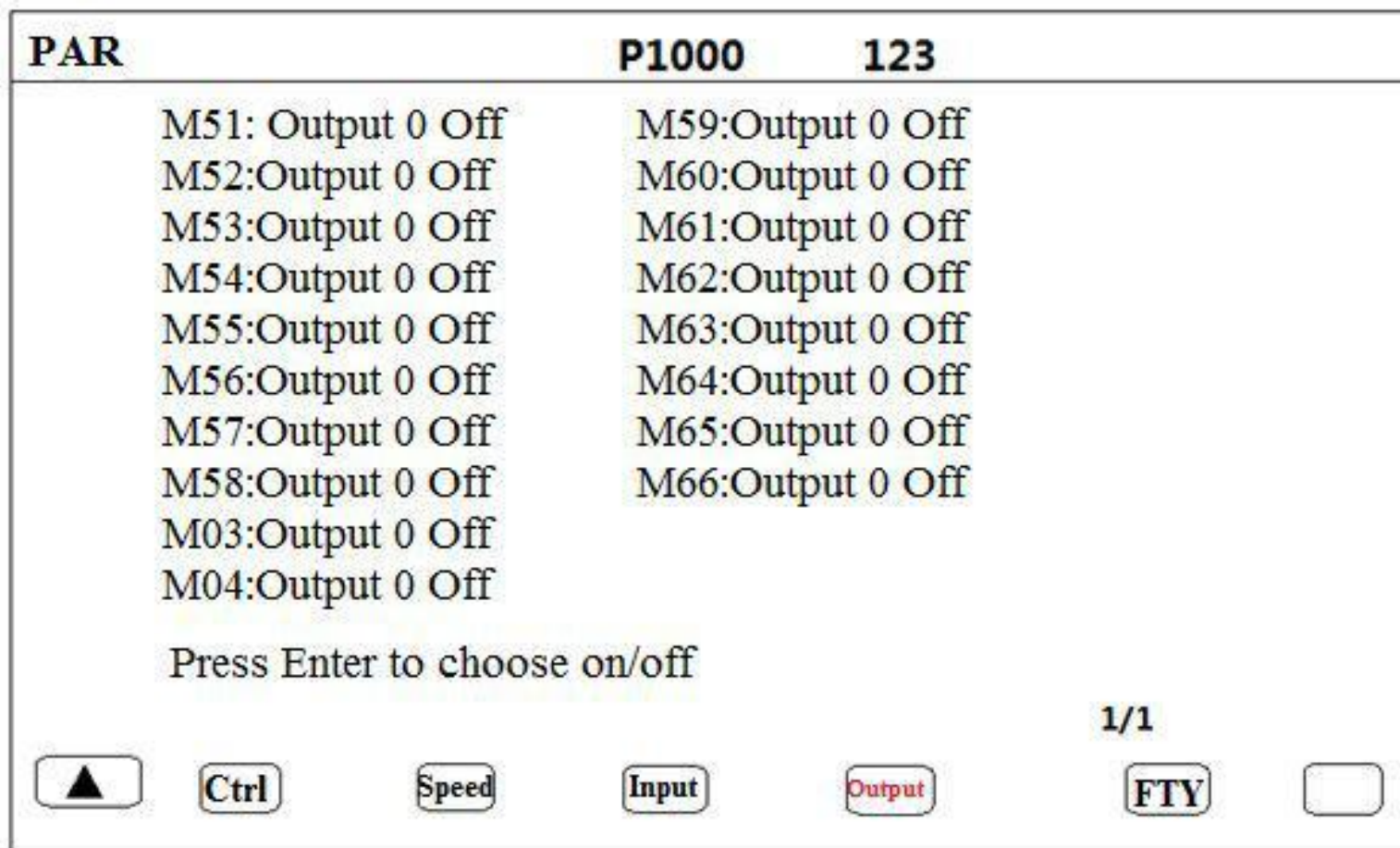
External Big switch is needed to finish external control. External switch is connected in the way of normal open. Press R to change *off* into *on*, and S to choose N.O.(Normal Open). Then choose the IO Port number in the blank.

Note: For safety consideration, limit and emergency stop input is usually set as N.C. (Normal Close).

Function	Explanation
Alert	Alert Input
Stop	Emergency Stop Input
Run	Outside(External) Run Switch Setting
Pause	Outside(External) Pause Switch Setting
Speed+	Feed rate increase Switch Setting
Speed-	Feed rate decrease Switch Setting
X Lim+	X axis Positive limit setting
X Lim-	X axis Negative limit setting
X 0	X axis zero switch setting
Man X+	X axis clockwise spinning outside manual switch
Man X-	X axis counter clockwise spinning outside manual switch

X Boot Zero	X axis go back to Machine zero after booting external manual switch
Y Lim+	Y axis Positive limit setting
Y Lim-	Y axis Negative limit setting
Y 0	Y axis zero switch setting
Man Y+	Y axis clockwise spinning outside manual switch
Man Y-	Y axis counter clockwise spinning outside manual switch
Y Boot Zero	Y axis go back to Machine zero after booting external manual switch
Z Lim+	Z axis Positive limit setting
Z Lim-	Z axis Negative limit setting
Z 0	Z axis zero switch setting
Man Z+	Z axis clockwise spinning outside manual switch
Man Z-	Z axis counter clockwise spinning outside manual switch
Z Boot Zero	Z axis go back to Machine zero after booting external manual switch
C Lim+	C axis Positive limit setting
C Lim-	C axis Negative limit setting
C 0	C axis zero switch setting
Man C+	C axis clockwise spinning outside manual switch
Man C-	C axis counter clockwise spinning outside manual switch
C Boot Zero	C axis go back to Machine zero after booting external manual switch

4.4 Output

```
PAR                              P1000        123
        M51: Output 0 Off          M59:Output 0 Off
        M52:Output 0 Off           M60:Output 0 Off
        M53:Output 0 Off           M61:Output 0 Off
        M54:Output 0 Off           M62:Output 0 Off
        M55:Output 0 Off           M63:Output 0 Off
        M56:Output 0 Off           M64:Output 0 Off
        M57:Output 0 Off           M65:Output 0 Off
        M58:Output 0 Off           M66:Output 0 Off
        M03:Output 0 Off
        M04:Output 0 Off

        Press Enter to choose on/off
                                                  1/1
   [▲]    [Ctrl]      [Speed]     [Input]     Output      [FTY]    (    )
```

In this interface to define the open and close of 1-8 output port, then you can directly use in programming. M03-M04 is spindle interlock.

4.5 FTY

Go back to factory value.

4.6 Operation

● Press ←→↑↓to move the cursor

● Long Press ↑↓to change page

● After changing the parameters, press **ESC**, here appears the window ask whether save the parameters or not, press **Enter** and save, press **ESC** or **Not** to give up saving.

5. Prog

In this interface to edit, read, delete, save and create program files.

SD Volume

Name	Size	Time
P1000	5581	2014-03-21
P1234	17882	2014-09-28

Left : 233104KB

| ▲ | | Edit | | Read | | DEL | | SaveAs | | New | | |

6. USB

USB Prog

Name	Size
P123.TXT	51

Boot Pic

Name	Size
K0004.BMP	230454
K0005.BMP	230454
K0006.BMP	230454

| ▲ | Import | Prog | Pic | | | |

- Program Name: P123.TXT or P1234. TXT

Boot Picture Name: K123.bmp or K1234.bmp Pixel: 320*240