E21 Operation Manual

(Version: V1.07)



ESTUN AUTOMATION CO., LTD

Total Solution Supplier

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Preface

This manual describes operation of E21 numerical control device and is meant for operators who are instructed for operation of the device. Operator shall read through this manual and know operation requirements before using this device.

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E21 device provides complete software control and has no mechanical protection device for operator or the tool machine. Therefore, in case of malfunction, machine tool must provide protection device for operator and external part of the machine tool. ESTUN is not responsible for any direct or indirect losses caused by normal or abnormal operation of the device.

ESTUN preserves the right to modifying this manual in the event of function adding or print error.

Chapter 1 Product Overview

1.1 Product introduction

This product is equipped with press brake machine dedicated numerical control device which is applicable to various users. On the basis of ensuring work precision, the cost of numerical control bending machine is reduced significantly.

Features of this product are listed below:

- Positioning control of back gauge.
- Intelligent positioning control.
- Unilateral and bidirectional positioning which eliminates spindle clearance effectively.
- Retract functions.
- Automatic reference searching.
- One-key parameter backup and restore.
- Fast position indexing.
- 40 programs storage space, each program has 25 steps.
- Power-off protection.

1.2 Operation panel

Operation panel is shown in Figure 1-1.



Figure 1-1 Operation panel

Functions of panel keys are described in Table 1-1.

Table 1-1 Description of key functions

Key	Function description
	Delete key: delete all data in input area on left bottom of displayer.
	Enter key: confirm the input content. If no content is input, the key has the similar function to direction key .
	Start key: automatic start-up, top left corner of the key is operation indicator LED. When operation is started, this indicator LED is on.
	Stop key: stop operation, top left corner of the key is Stop indicator LED. When initialize normal start-up and no operation, this indicator LED is on.
	Left direction key: page forward, cursor remove
	Right direction key: page backward, cursor remove
	Down direction key: select parameter downward
	Function switch: switch over different function pages
	Symbolic key: user input symbol, or start diagnosis.
	Numeric key: when setting parameter, input value.
	Decimal point key: when set up parameter, input decimal point.
	Manual movement key: in case of manual adjustment, make adjustment object move in forward direction at low speed.
	Manual movement key: in case of manual adjustment, make adjustment object move in backward direction at low speed.
	High speed selection key: in case of manual adjustment, press this key and press  simultaneously, make adjustment object move in increasing direction at high speed, then press , make adjustment object move in decreasing direction at high speed.

1.3 Displayer

E21 numerical control device adopts 160*160 dot matrix LCD displayer. The display area is shown in Figure 1-2.

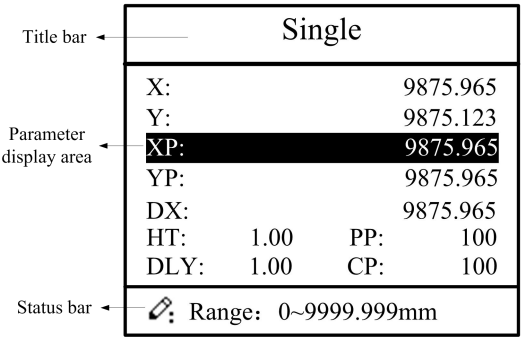


Figure 1-2 Display area

- Title bar: display relevant information of current page, such as its name, etc.
- Parameter display area: display parameter name, parameter value and system information.
- Status bar: display area of input information and prompt message, etc.

The paraphrases of shortening on this page are as shown in Table 1-2.

Table 1-2 The paraphrases of shortening

Shortening	Description
X	The current backgauge position
Y	The current slider position
XP	The desired backgauge position
YP	The desired slider position
DX	Backgauge retract distance
HT	Holding delay
DLY	Retracting delay
PP	Preset workpiece
CP	Current workpiece

Chapter 2 Operation Instruction

2.1 Basic operation procedure

Basic switch over and operation procedure of the device is shown in Figure 2-1.

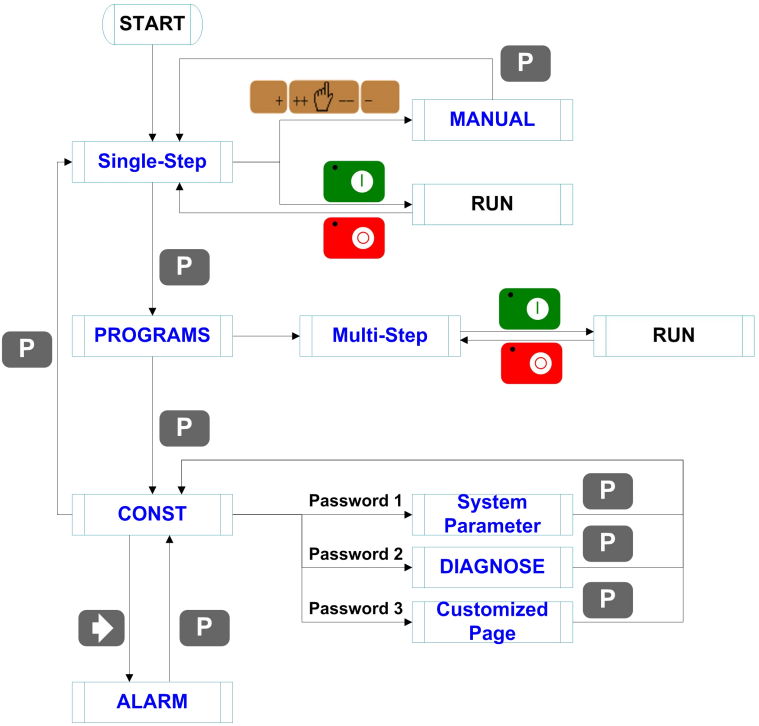


Figure 2-1 Basic Operational Flow

2.2 Programming

The device has two programming methods, which are single-step programming and multi-step programming. User can set up programming according to actual demand.

2.2.1 Single-step programming

CAUTION
When the parameter **X** or **Y** displays ******** on the page, please do not enter the **RUN** page or **Manual** page, unless you have reset the teach function of X-axis or Y-axis.

Single-step programming is generally used for processing single step to finish work piece processing. When controller is power on, it will automatically enter single-step program page.

Operation steps

Step 1 After starting up, the device will enter setting up page of single-step program automatically, as shown in Figure 2-2.

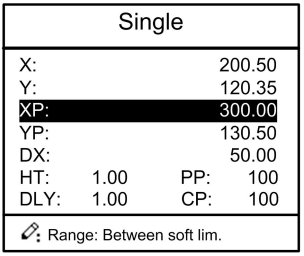


Figure 2-2 Single-step program setting page

Step 2 Press , select parameter which needs to be set up, press numerical key to input program value, press to complete input.

[Note] Parameter can only be set when Stop indicator is on.

Setting range of singe step parameter is shown in Table 2-1.

Table 2-1 Set up range of singe step parameter

Parameter name	Unit	Set up range	Remarks
X	mm/inch	-	Current position of X axis, unable to be modified.

Parameter name	Unit	Set up range	Remarks
Y	mm/inch	-	Current position of Y axis, unable to be modified.
XP	mm/inch	0~9999.999	Program position of X axis.
YP	mm/inch	0~9999.999	Target position of Y axis.
DX	mm/inch	0~9999.999	Retract distance of X axis.
HT	s	0~99.99	The time between concession signal valid and end hold time output.
DLY	s	0~99.99	In case of single step, delay time for X axis concession.
PP	-	0~9999	Number of preset work piece.
CP	-	0~9999	Number of current work piece.

Step 3 Press , system will execute according to this program, as shown in Figure 2-3.

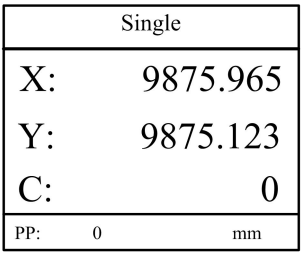


Figure 2-3 Single step operation page

Operation example

On single-step program page, program bending depth to 100.0mm, back gauge position to 80.00mm, retract distance to 50mm, concession waiting time to 2s, holding time to 3s, work piece to 10.

Operation steps are shown in Table 2-2.

Table 2-2 Operation steps of single step example

Operation steps	Operation
Step 1	Press , select “XP” parameter.
Step 2	Input 80.00 by numerical key.
Step 3	Press , confirm setting of this parameter.

Operation steps	Operation
Step 4	Press , select “YP” parameter.
Step 5	Input 100.0 by numerical key.
Step 6	Press , confirm set up of this parameter.
Step 9	Press , select “DX” parameter, “DLY” parameter, “HT” parameter, “PP” parameter respectively.
Step 10	Set up parameter to 50mm, 2s, 3s, 10, 0 by numerical key.
Step 11	Press , system execute according to this program.

2.2.2 Multi-step programming

CAUTION
When the parameter **X** or **Y** displays ******** on the page, please do not enter the **RUN** page, unless you have reset the teach function of X-axis or Y-axis.

Multi-step program is used for processing single work piece of different processing steps, realize consecutive implementation of multi-steps, and improve processing efficiency.

Operation step

Step 1 Power on, the device displays the single-step parameter page automatically.

Step 2 Press , switch to program manage page, as shown in Figure 2-4.

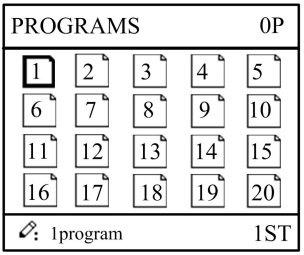


Figure 2-4 Program management page

Step 3 Press , select program serial number, or input program number directly, such as input “1”.

Step 4 Press , enter multi-step program setting page, as shown in Figure 2-5.

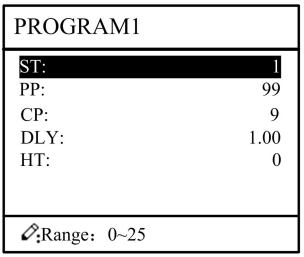


Figure 2-5 Multi-step program setting page

Step 5 Press , select multi-step programming parameter which requires set up, input setting up value, press , and the set up takes effect.

Step 6 In completion of set up, press , enter step parameter set page, as shown in Figure 2-6.

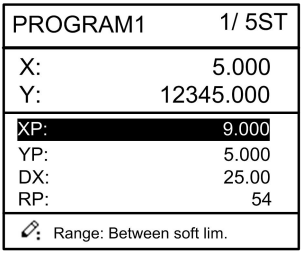


Figure 2-6 Step parameter set page

Step 7 Press , select step parameter that needs to be set up, input program value, press , and the setup takes effect.

Step 8 Press to switch over between steps. If the current step is the first step, press to enter the last page of step parameter setting; if the current step is the last one, press to enter the first page of step parameter setting.

Multi-step parameter setting range is shown in Table 2-3.

Table 2-3 Multi-step parameter setting range

Parameter name	Unit	Setting range	Remarks
Step number of program	-	0~25	Set up total processing step number of this program

Parameter name	Unit	Setting range	Remarks
Preset work piece number	-	0~9999	Number of work piece to be processed, decreasing piece when more than zero; negative increasing count.
Current work piece number	-	0~9999	Number of finished work piece
Concession delay	s	0~99.99	Time between retract signal and concession execution.
Holding time delay	s	0~99.99	Time between concession signal and end pressurize output
X	mm/inch	-	Current position of X axis, can't be modified;
Y	mm/inch	-	Current position of Y axis, can't be modified;
X target position	mm/inch	0~9999.999	Program position of X axis;
Y target position	mm/inch	0~9999.999	Target position of Y axis;
concession distance	mm/inch	0~9999.999	Distance of X axis concession;
Repeat times	-	1~99	Repeat times required by this step.

Step 9 Press , system will operate according to this program, as shown in Figure 2-7.

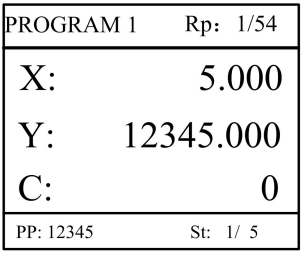


Figure 2-7 Multi-step programming operation page

Operation example

[Background] One work piece requires processing 50 as shown below;

- First bend: 50mm;
- Second bend: 100mm;
- Third bend: the other direction 300mm;

[Analysis] according to work piece and technological conditions of machine tool:

- First bend: X axis position is 50.0mm; Y axis position is 85.00mm, concession 50mm;
- The second bend: X axis position is 100.0mm; Y axis position is 85.00mm, concession 50mm;
- The third bend: X axis position is 300.0mm; Y axis position is 85.00mm, concession 50mm;

Edit processing program of this work piece on No. 2 program.

Operation procedure is shown in Table 2-4.

Table 2-4 Operation steps of multi-step programming example

NO.	Operation
Step 1	On single step parameter setting page, press P to enter program selection page.
Step 2	Input “2”, press ↵, enter multi-step general parameter setting page of program 2.
Step 3	Select “Program step”, input “3”, press ↵, the setting takes effect.
Step 4	Select “number of preset work piece”, input “50”, press ↵, the setup takes effect.
Step 5	Similar to step 3 and step 4, set “current work piece number”, “concession delay” and “pressurize time” to 0, 400, 200 respectively.
Step 6	Press → to enter first step setup page of step parameter.
Step 7	Select “X target position”, input 50, press ↵, the setup takes effect.
Step 8	Select “Y target position”, input 85, press ↵, and the setup take effect.

NO.	Operation
Step 9	Similar to step 7, 8, set up “concession distance” and “repeat times” to 50, 1 respectively.
Step 10	Press  to enter second step setup page of step parameter, the setup method is similar to that of step one.
Step 11	Press  again, to enter third step setup page of step parameter, the setup method is similar to that of step one and step two.

<Note>

■ In completion of multi-step programming, return to start step before launching the system; otherwise, the program will start position processing at current step.

■ Press left and right direction key to circulate page turning and browsing among all step parameters.

■ Program can be called and revised again.

■In completion of processing all work pieces (50 in the example), system stops automatically. Restart directly will start another round of processing 50 work pieces.

2.3 Parameter setting

User can setup all parameters required for normal operation of the system, including system parameter, X axis parameter and Y axis parameter.

Step 1 On program management page, press  to enter programming constant page, as shown in Figure 2-8. On this page, programming constant can be set.

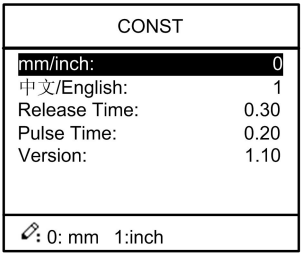


Figure 2-8 Programming constant page

Range of programming constant setup is shown in Table 2-5.

Table 2-5 Range of programming constant setup

Parameter name	Unit	Range	Default	Remarks
mm/inch	-	0 or 1	0	0: mm, 1: inch
中文/English	-	0 or 1	0	0: Chinese, 1: English
Release Time	s	0 to 99.99	0.3	Continue time of unloading output after starting the system.
Pulse Time	s	0.000 to 1.000	0.200	The duration of the pulse signal.
Version	-	-	-	Software version information, V refers to version. 1: indicates version number. 0: indicates version level.

Step 2 Input password “1212”, press  to enter the Teach Page, as shown in Figure 2-9.

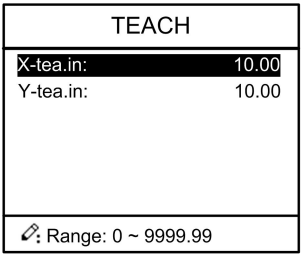


Figure 2-9 System parameter setting page

Step up parameter, parameter setup range is shown in Table 2-6.

Table 2-6 System parameter setup range

Parameter Name	Unit	Range	Default	Remarks
X-tea.in	mm	0~9999.99	10	In teach enable, input current position of X axis
Y-tea.in	mm	0~9999.99	10	In teach enable, input current position of Y axis

<How to Teach>:

You can directly measure the positions of slider and back gauge. If the measurement is difficult, you can program and operate any one process, and then measure the accomplished workpiece.

Step 3 Press P, return to programming constant page.

----End

2.4 Manual adjustment

In single-step mode, axis movement can be controlled by pressing key manually. This method helps user to adjust machine tool and work piece.

Step 1 On single step parameter setup page, press + or − to enter manual page, as shown in Figure 2-10.

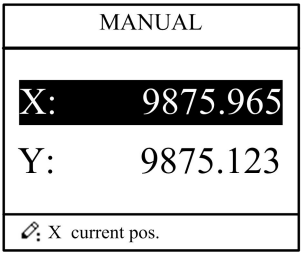


Figure 2-10 Manual page

Step 2 According to your actual requirement, following the above table to adjust the position of the axis.

- If the drive mode of the corresponding axis is **common motor**:

Press Key	Status	Direction	Running Time	Speed
+	Stop	increasing	Press time	Slow
	Run	increasing	• Press time (if it is less than "Pulse Time") • Pulse Time (If it is less than Press time)	Slow
−	Stop	decreasing	Press time	Slow
	Run	decreasing	• Press time (if it is less than "Pulse Time") • Pulse Time (If it is less than Press time)	Slow
++ −− +	Stop	increasing	Press time	Slow
	Run	increasing	Press time	Slow
++ −− +	Stop	decreasing	Press time	Slow
	Run	decreasing	Press time	Slow

<Note>: When the system is on run status, the operation of manual adjustment is just valid for the X-axis.

- If the drive mode of the corresponding axis is **frequency**:

Press Key	Status	Direction	Running Time	Speed
+	Stop	increasing	Press time	Slow
	Run	Cannot do it		
–	Stop	decreasing	Press time	Slow
	Run	Cannot do it		
++ + +	Stop	increasing	Press time	Fast
	Run	Cannot do it		
++ + –	Stop	decreasing	Press time	Fast
	Run	Cannot do it		

Step 3 Press P return to single step parameter setting page.

----End

Chapter 3 Alarm

The device can detect internal or external abnormity automatically and send out alarm prompt. Alarm message is available on alarm list.

Step 1 On programming management page, press P to enter programming constant page.

Step 2 On programming constant page, press → to enter "Alarm history" page to view all alarm history.

As shown in Figure 3-1, the latest 6 alarms, alarm number and causes can be viewed on this page.

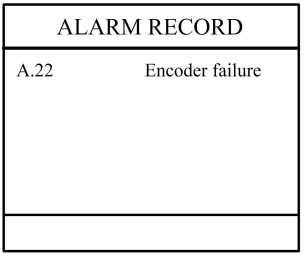


Figure 3-1 Alarm history page

Alarm history and message is shown in Table 3-1.

Table 3-1 Alarm number and alarm message

Alarm number	Alarm name	Alarm description
A.02	XPos < minimum	Move X-axis forwards in Manual Movement.
A.03	XPos > maximum	Move X-axis backwards in Manual Movement.
A.04	YPos < minimum	Move Y-axis forwards in Manual Movement.
A.05	YPos > maximum	Move Y-axis backwards in Manual Movement.
A.06	X out of lmt.	Re-teach the position of X-axis.
A.11	Count reached shut-down	Rerun, the alarm is cleared automatically.
A.12	Beam is not on upper dead point	Step on the Foot Up Switch, moving the slider to the TDC, and the alarm will be cleared automatically.
A.13	X Un-teachIn	Re-teach the position of X-axis.
A.14	Y Un-teachIn	Re-teach the position of Y-axis.

Alarm number	Alarm name	Alarm description
A.21	Oil pump not started	Check whether the pump signal is connected, and check whether the pump switch is on.
A.22	Encoder failure	Check whether the encoder wiring is normal.
A.25	Drive mode err	Reprogram the Drive Mode for X-axis and Y-axis.
A.26	X Stop Err	Check whether the back gauge motor is run normally.
A.27	Y Stop Err	Check whether the slider motor is run normally.
A.28	X V2 Err	Check whether the back gauge motor is run normally.
A.29	X V3 Err	Check whether the back gauge motor is run normally.
A.30	Y V2 Err	Check whether the slider motor is run normally.
A.31	Y V3 Err	Check whether the slider motor is run normally.
A.32	XPos < 0	Move X-axis forwards to the setting range in Manual Movement.
A.33	YPos < 0	Move Y-axis forwards to the setting range in Manual Movement.
A.41	Parameter storage error	Back to factory for repairing

----End

Appendix Common fault and troubleshooting

Fault phenomena	Trouble shooting
The screen don't display when power on.	• The terminal of power supply wiring is error. Follow the nameplate to rewire. • The source voltage is too low. • The connector is not connected well.
The back gauge motor doesn't run when X-axis is operated, but the slider motor runs.	The wires of these two motor are in reverse, please rewire.
The motor doesn't run when operating.	• Check whether the machine is impeded, or whether the slider is back to TDC • Check whether the motor wire is connected well.
The motor can't mutually convert from high to low	• Check whether the signal is in effect, or whether frequency converter is normal. • Check whether parameter **Mute Dis.** is programmed correctly.
The step can't be changed in Multi-Step mode.	Check the **START** terminal is connected to +24V when the slider is on TDC.
The counter doesn't work in Multi-Step mode.	Check the **START** terminal is connected to +24V when the slider is on TDC.
Lose control of the system	• Check whether the encoder cable is connected well. • Check whether the motor direction wiring (X+, X-, Y+, Y-) is correct.
The actual position of X-axis or Y-axis is unchanged or unshown.	Check whether the encoder cable is connected well or correctly.



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