ESTUN

E21 Press Brake Numerical Control Device Operation Manual

V1.00

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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.

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Content

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:

1. Positioning control of back gauge.
2. Intelligent positioning control.
3. One-side and two-side positioning which eliminates spindle clearance effectively.
4. Retract functions.
5. Automatic reference searching.
6. One-key parameter backup and restore.
7. Fast position indexing.
8. 40 programs storage space, each program has 25 steps.
9. Power-off protection.

1.2 Operation panel

Operation panel is shown in Figure 1-1.

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Figure 1-1 Operation panel

Functions of panel keys are described in Table 1-5.

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, in which is operation indicator LED. When operation is started, this indicator LED is on.
	Stop key: stop operation, in which 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.

Key	Function description
0 ~ 9	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.

Title bar →

Single

Parameter display area →

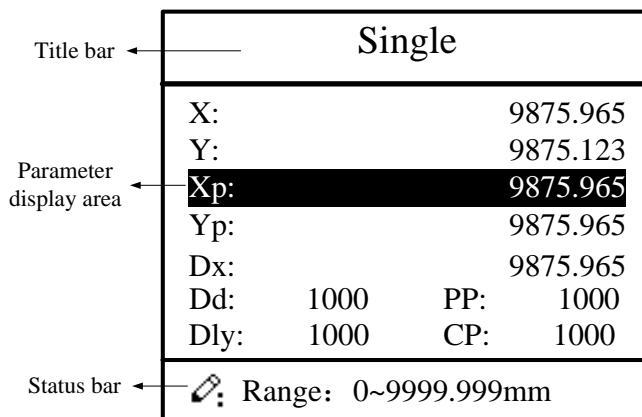| X: | | | 9875.965 |
Y:			9875.123
Xp:			**9875.965**
Yp:			9875.965
Dx:			9875.965
Dd:	1000	PP:	1000
Dly:	1000	CP:	1000

Status bar →

✎: Range：0~9999.999mm

Figure 1-2   Display area

In which

- 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.

2 Operation Instruction

2.1 Basic operation procedure

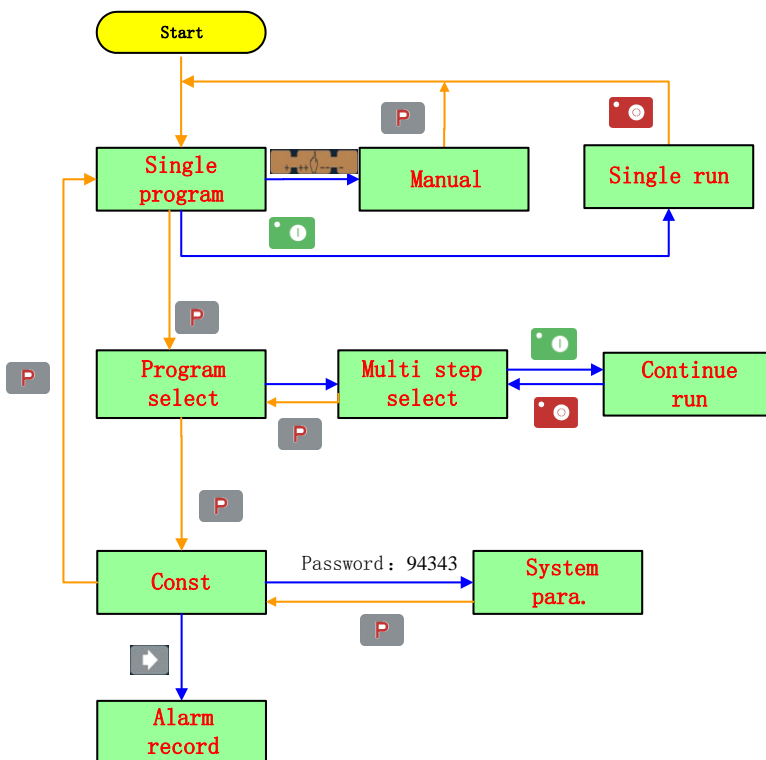Basic switch over and operation procedure of the system is shown in 2-1.

Figure 2-1 Basic Operational Flow Chart

2.2 Programming

The system 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

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.

```
┌─────────────────────────────────┐
│            Single               │
├─────────────────────────────────┤
│  X:                  9875.965   │
│  Y:                  9875.123   │
│  Xp:                 9875.965   │
│  Yp:                 9875.965   │
│  Dx:                 9875.965   │
│  Dd:   1000      PP:    1000    │
│  Dly:  1000      CP:    1000    │
├─────────────────────────────────┤
│  ✎: Range：0~9999.999mm         │
└─────────────────────────────────┘
```

Figure 2-2 Single-step program setting page

Step 2 Click [▼], select parameter which needs to be set up, press numerical key to input program value, press [←] to complete input.

📖 说明 Instruction

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	None	Current position of X axis, can't be modified;
Y	mm/inch	None	Current position of Y axle, can't be modified;
XP	mm/inch	0 ～ 9999.999mm	Program position of X axle;
YP	mm/inch	0 ～ 9999.999mm	Target position of Y axle;
DX	mm/inch	0 ～ 9999.999mm	Retract distance of X axle;
HT	ms	0～99999ms	The time between concession signal valid and end hold time output;
DLY	ms	0～99999ms	In case of single step, delay time for X axle concession;

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Parameter name	Unit	Set up range	Remarks
PP	None	0～99999	Number of preset work piece;
CP	None	0～99999	Number of current work piece.

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

Single	
X:	9875.965
Y:	9875.123
C:	0
PP: 0	mm

Figure 2-3 Single step operation page

Operation example

Requirements: 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 200ms, holding time to 300ms, 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	Click [icon], select "XP" parameter.
Step 2	Input 80.00 by numerical key.
Step 3	Click [icon], confirm setting of this parameter.
Step 4	Click [icon], select "YP" parameter.
Step 5	Input 100.0 by numerical key.

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Operation steps	Operation
Step 6	Click [⬅], confirm set up of this parameter.
Step 9	Click [⬇], select"DX"parameter, "DLY"parameter, "HT"parameter , "PP"parameter"CP"parameter respectively.
Step 10	Set up parameter to 50mm, 200ms, 300ms, 10,0 by numerical key.
Step 11	Click [⬤], system execute according to this program.

2.2.2 Multi-step programming

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, system enters to single-step parameter set up page automatically.

Step 2 Click [P], switch to program manage page, as shown in Figure 2-4.

```
PROGRAMS           0P
 1   2   3   4   5
 6   7   8   9  10
11  12  13  14  15
16  17  18  19  20
✎: 1program        1ST
```

Figure 2-4 Program management page

Step 3 Click [◀] [▶] [⬇], select program serial number, or input program number directly, such as input "1".

Step 4 Click [⬅], enter multi-step program setting page, as shown in Figure 2-5.

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```
┌─────────────────────────────┐
│ PROGRAM1                    │
├─────────────────────────────┤
│ ST:                    1    │
│ PP:                    99   │
│ CP:                    9    │
│ DLY:                   100  │
│ HT:                    0    │
│                             │
├─────────────────────────────┤
│ ✎:Range: 0~25               │
└─────────────────────────────┘
```

Figure 2-5 Multi-step program setting page

Step 5 Click [↓], select multi-step programming parameter which requires set up,

input setting up value, click [←], the set up takes effect.

Step 6 In completion of set up, click [→], enter step parameter set page, as shown in Figure 2-6.

```
┌─────────────────────────────┐
│ PROGRAM1          1/ 5ST    │
├─────────────────────────────┤
│ X:               5.000      │
│ Y:           12345.000      │
├─────────────────────────────┤
│ XP:              9.000      │
│ YP:              5.000      │
│ DX:             25.00       │
│ RP:             54          │
├─────────────────────────────┤
│ ✎:Range: 0~9999.999mm       │
└─────────────────────────────┘
```

Figure 2-6 Step parameter set page

Step 7 Click [↓], select step parameter that needs to be set up, input program value, click [←], the setup takes effect.

Step 8 Click [←] [→] to switch over between steps. If the current step is the first step, click [←] to enter the last page of step parameter setting; if the current step is the last one, click [→] 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	None	0-25	Set up total processing step number of this program
Preset work piece number	None	0~99999	Number of work piece to be processed, decreasing piece when more than zero; negative increasing count.
Current work piece number	None	0~99999	Number of finished work piece
Concession delay	ms	0~99999ms	Time between retract signal and concession execution.
Holding time delay	ms	0~99999ms	Time between concession signal and end pressurize output
X	mm/inch	None	Current position of X axle, can't be modified;
Y	mm/inch	None	Current position of Y axle, can't be modified;
X target position	mm/inch	0~9999.999mm	Program position of X axle;
Y target position	mm/inch	0~9999.999mm	Target position of Y axis;
concession distance	mm/inch	0~9999.999mm	Distance of X axle concession;
Repeat times	None	1~99	Repeat times required by this step.

Step 9 Click [icon], system will operate according to this program, as shown 2-7.

PROGRAM 1	Rp：1/54
X:	5.000
Y:	12345.000
C:	0
PP: 12345	St: 1/ 5

Figure 2-7 Multi-step programming operation page

Operation example

Requirements: 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 axle position is 50.0mm，Y axle position is 85.00mm，concession 50mm;

The second bend: X axle position is 100.0mm，Y axle position is 85.00mm，concession 50mm;

The third bend: X axle position is 300.0mm，Y axle 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

Operation step	Operation
Step 1	On single step parameter setting page, press to enter program selection page.
Step 2	Input "2", click , enter multi-step general parameter setting page of program 2.
Step 3	Select "Program step", input "3", click , the setting takes effect.
Step 4	Select "number of preset work piece", input "50", click , 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	Click to enter first step setup page of step parameter.

Operation step	Operation
Step 7	Select "X target position", input 50, click [arrow], the setup takes effect.
Step 8	Select "Y target position", input 85, click [arrow], the setup takes effect.
Step 9	Similar to step 7, 8, set up "concession distance" and "repeat times" to 50, 1 respectively.
Step 10	Click [arrow] to enter second step setup page of step parameter, the setup method is similar to that of step one.
Step 11	Click [arrow] again, to enter third step setup page of step parameter, the setup method is similar to that of step one and step two.
Step12	Click [arrow], return to setup page of the first step.
Step13	Click [button], system will operate according to this program.

📖 说明 Instruction

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

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

3. Program can be called and revised again.

4. In completion of processing all work pieces (50 in the example), system come to stop 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 axle parameter and Y axle parameter.

Operation steps

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

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```
                CONST
┌─────────────────────────────────────┐
│  mm/inch:                         0  │
│  中文/English:                    1  │
│  X-tea.in:                    1.000  │
│  Y-tea.in:                    1.000  │
│  Release time:                23654  │
│  Version：                    V1.00  │
├─────────────────────────────────────┤
│  ✎:Range：0~9999.999mm               │
└─────────────────────────────────────┘
```

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	Setup range	Default	Remarks
X axle indexing	mm	0-9999.99mm	0	In teach enable, input current position of X axle
Y axle teach	mm	0-9999.99mm	0	In teach enable, input current position of Y axle
Metric/English system	None	0 or 1	0	0：metric，1：English system
Chinese/English	None	0 or 1	0	0：Chinese，1：English
Decompression delay	ms	0-99999ms	0	Continue time of unloading output after starting the system.
Version number	None	None	None	Software version information, V refers to version, 1 indicates version number, 0 indicates version level.

Step 2 Input password "94343", click [↵] to enter system parameter setting page, as shown in Figure 2-9.

```
SYS PARA          1/ 1PG

X-digits:                    3
Y-digits:                    3
X-safe:                  1.000
Y-safe:                  1.000
Step delay:               3333


Range：0~3
```

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 range	Unit	Setup range	Default	Remarks
Decimal point of X axle	None	0-3	2	Decimal point displayed by X axle position parameter
Decimal point of Y axle	None	0-3	2	Decimal point displayed by Y axle position parameter
Safe distance of X axle	mm	0-9999.999mm	0	X axle keeps low speed in this range
Safe distance of Y axle	mm	0-9999.999mm	0	Y axle keeps low speed in this range
Change step delay	ms	0-9999ms	0	Interval between valid change step signal and change step operation executed

Step 4 Click   , return to programming constant page.

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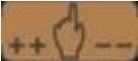
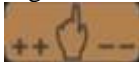In single-step mode, axle movement can be controlled by pressing key manually. This method helps user to adjust machine tool and work piece.

Operation steps

Step 1 On single step parameter setup page, click   or   to enter manual page, as shown in Figure 2-9.

![ESTUN]

```
            MANUAL

  X:           9875.965

  Y:           9875.123

  🖉: X  current pos.
```

Figure 2-9 Manual page

Step 2 Click [+] , operate at low speed in increasing direction.

Click [–] , operate at low speed in decreasing direction.

Click [++ 👆 ––] , click [+] at the same time, operate at high speed in increasing direction.

Click [++ 👆 ––] , click [–] at the same time, operate at high speed in decreasing direction.

Step3 Click [P] return to single step parameter setting page.

3 Alarm

3.1 Alarm

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

Operation steps

Step 1 On programming management page, click [P] to enter programming constant page.

Step 2 On programming constant page, click [→] 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.

ALARM RECORD
A.24   Mach. Not read

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.01	Count reached prompt	Count reaches preset value
A.02	Minimum soft limit	Minimum soft limit
A.03	Maximum soft limit	Maximum soft limit

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A.11	Count reached shut-down	When count reaches preset value, system shut down automatically.
A.12	Beam is not on upper dead point	In single step and multistep mode, slider is not on upper dead center.
A.21	Limit switch abnormal	
A.22	Encoder failure	Encoder voltage is too low
A.23	Communication abnormal	
A.24	Oil pump not started	Oil pump signal loss
A.41	Parameter storage error	None
A.42	Abnormal power failure	None
A.43	System self-checking error	None

Appendix 1 Common fault and troubleshooting

Fault phenomena	Trouble shooting
When power on, system will not display.	Check whether No. 1 (24V) and No. 2 (0V) terminal is connected or not, or signal is reversed.
When X axle programming is operating, back gauge motor does not move, Y AXIS motor moves.	Two motors are reversed. Reconnect.
When program is operating, motor does not move.	Check whether mechanical part has been locked or slider returns to upper dead center.
Motor can't switch from high speed to low speed.	Check whether high-low speed signal has been sent or motor power is too small.
When system is in multi-step programming, the program can't change step.	Check when slider is on upper dead center, No. 1（START）terminal is connected to +24V or not.
When system is in multi-step programming, the program can't count.	Check when slider is on upper dead center, No. 5（COUNT）terminal is connected to +24V or not.
When programming is operating, the system loses control.	Check whether encoder cable is connected or not.
When programming is operating, system actual position will not display or change.	Check whether encoder wiring is correct or encoder cable is connected well.

Appendix 2 Acronym

Acronym	English interpretation
C	
C	COUNT
CP	Current Pieces
D	
DX	Retract
DLY	Delay time
H	
HT	Holding time
P	
PP	Preset Pieces
S	
ST	STEP
X	
X	X-axis
XP	X-axis position
Y	
Y	Y-axis
YP	Y-axis position