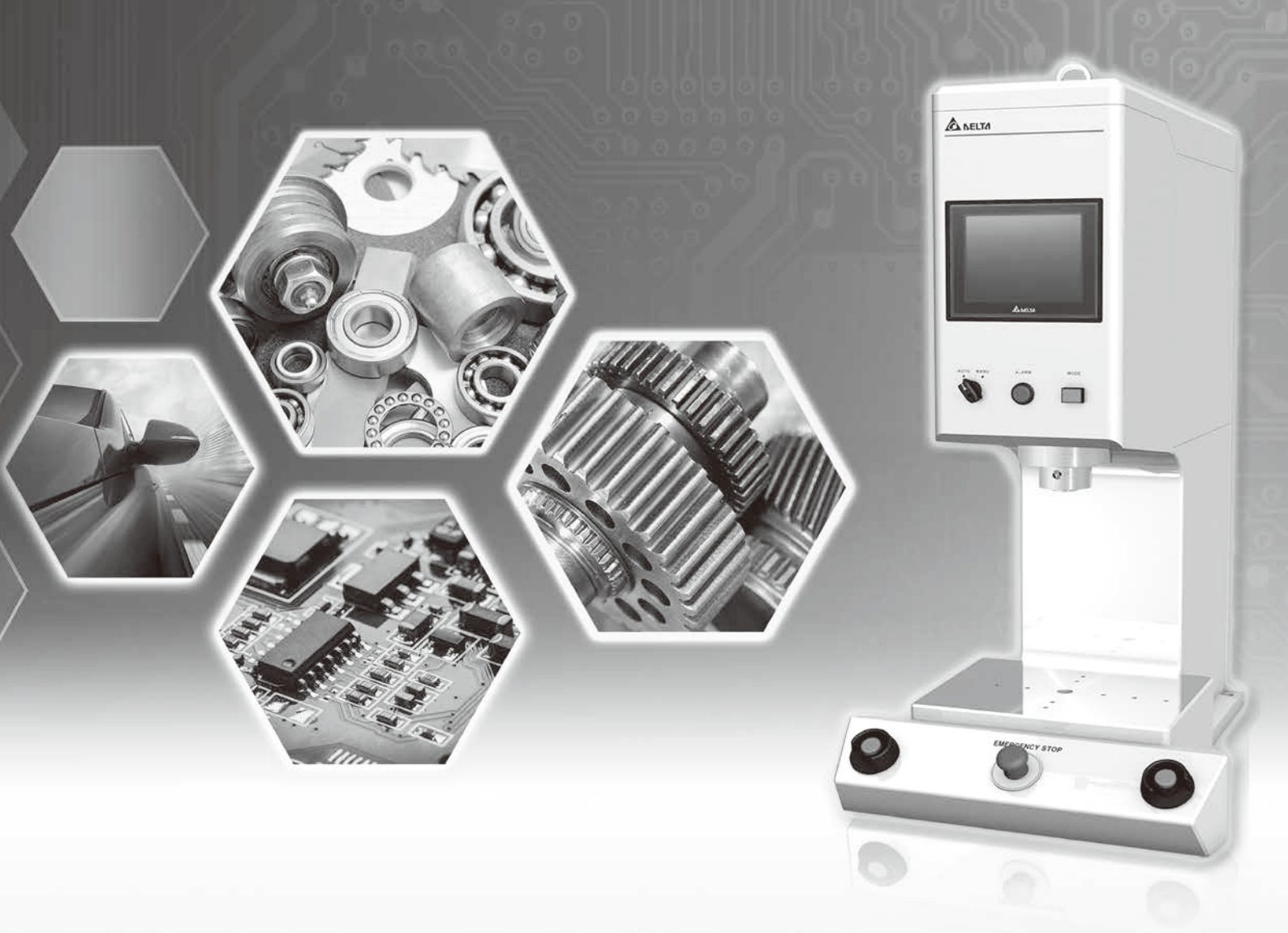

Delta Electric Servo press operation manual

www.deltaww.com

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Contents

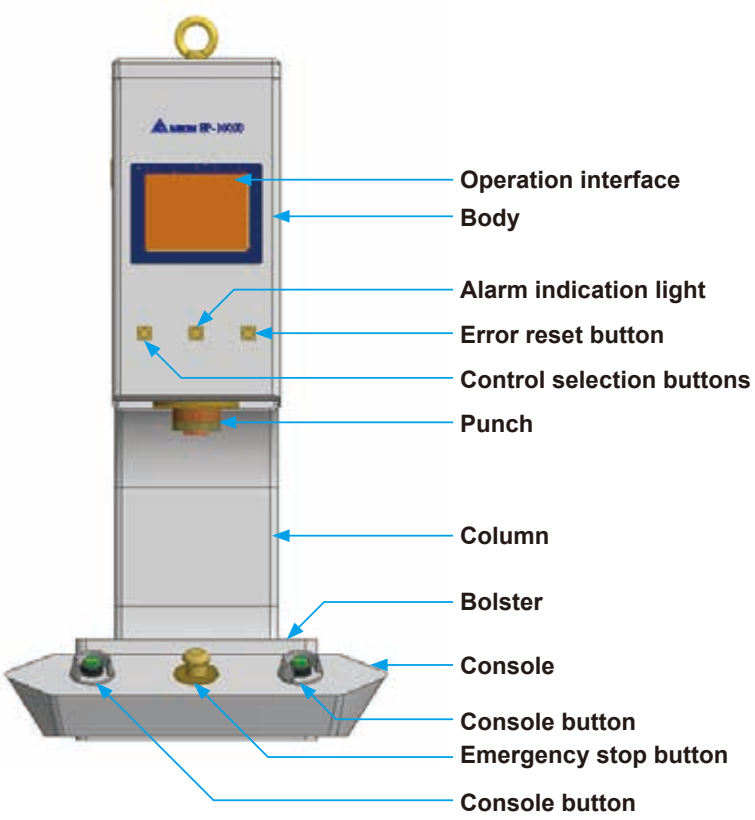
Delta Electric Servo press operation manual

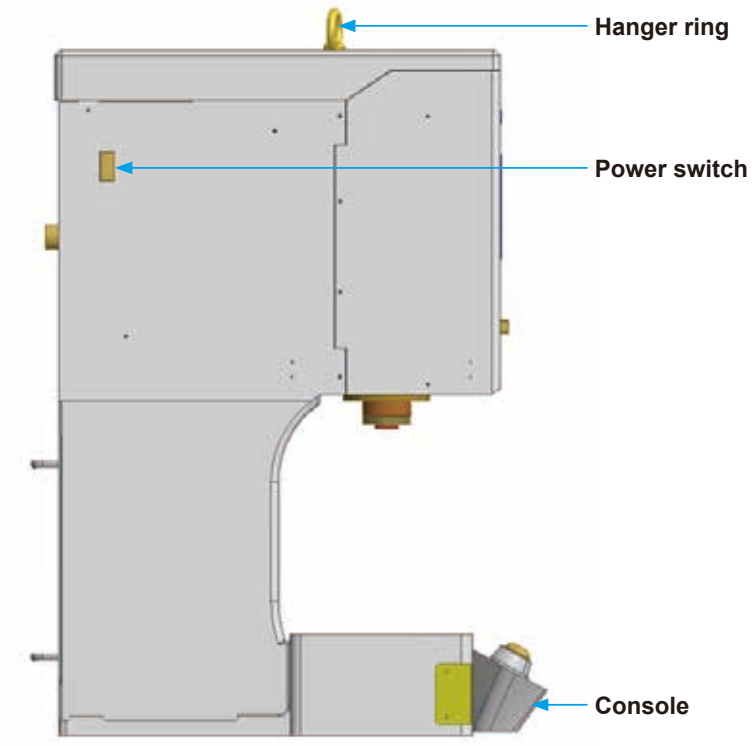
1. Component names and functions

1. Component names and functions

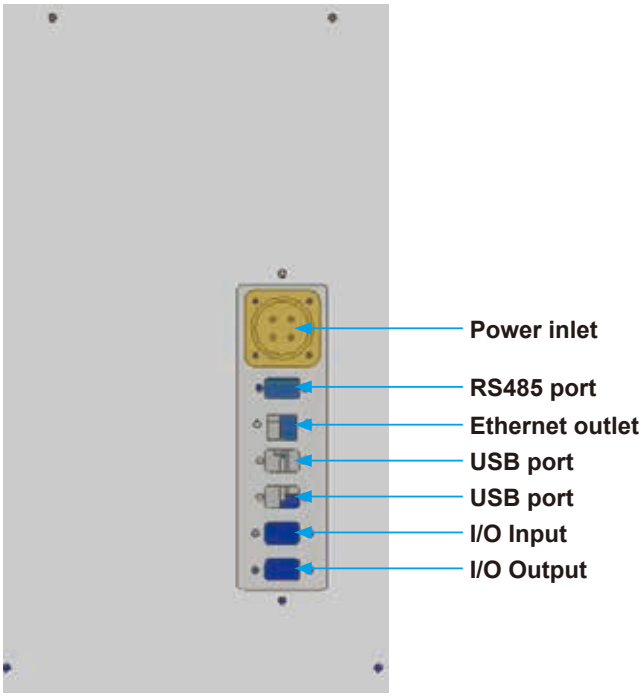
1-1. Component names

Standard type





Standard type body rear side



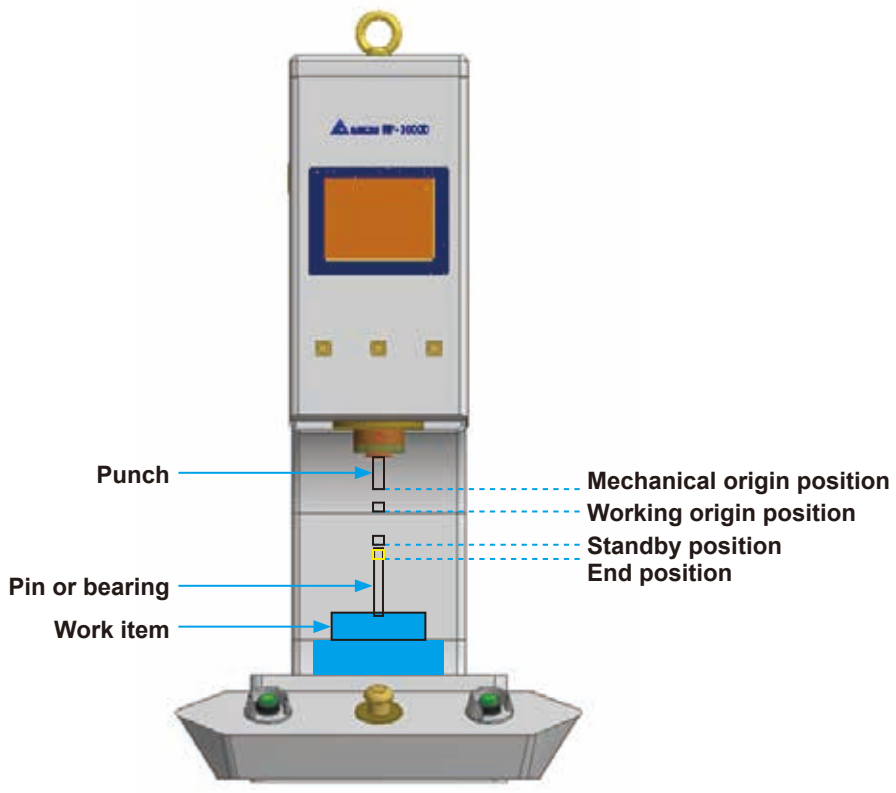
2. Basic movements and condition determination

2. Basic movements and condition determination

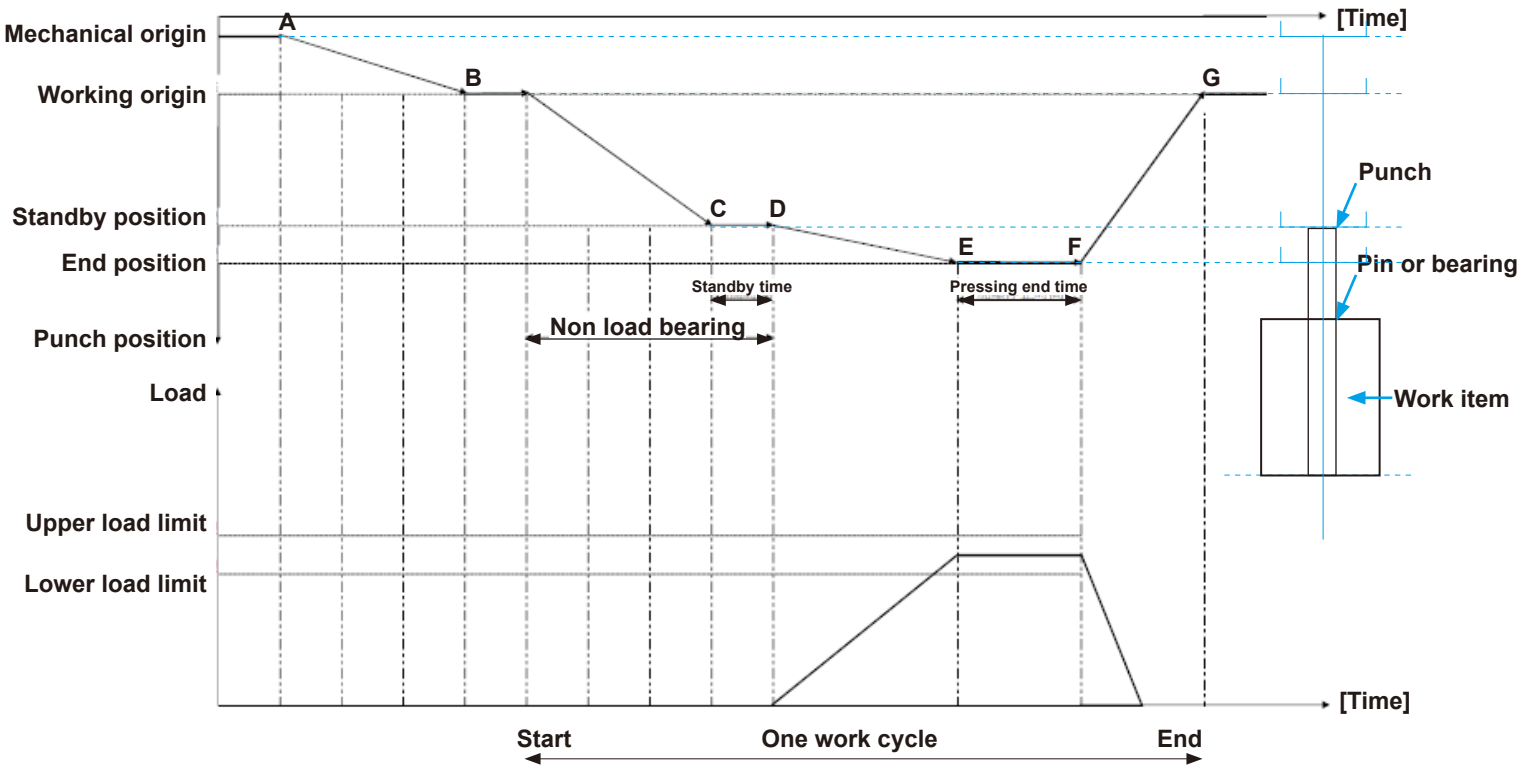
This section gives an overview of the servo press′ s basic movements and condition determination.
The servo press offers selected operation and combined operation with several movement modes. Here we use the "position mode" to explain the principles of its movements.
(Place jig on the base and punch in position. Place item to be measured on top of the jig.)

We can see that the servo press has the below primary positions:
A. Mechanical origin position (this is the origin position for the servo press).
B. Working origin position (this position may eliminate unnecessary movement positions).
C. Standby position (work item's position when pressing starts on contact).
D. End position (work item's position when pressing is done).

Except for the mechanical origin, the other three positions may all be freely determined in the recipe configurations.
The below figure illustrates the servo press′ s basic movements.



2-1. Servo press basic movements



Once the start button on the user interface is pressed, the punch will rapidly drop down from the mechanical origin (A) to the working origin position at original velocity. Then it will wait until the operator presses the console buttons on the sides. When this happens, the punch will drop to the standby position at standby velocity, and to the end position at pressing velocity. When the pressing time is up, it will rise to the working origin position at original velocity. A work movement cycle is now completed.

The above movement is for position mode, configured to apply force on the work item until the specified position is reached. This is a valid mode configuration.

Besides position mode, there is load mode, for which the punch reaches the end point and changes its configuration to stop when a target load is achieved. This movement mode has the same goal as position mode, that is, to set the stop load value and apply force on the work item until the set value is reached. It is also a valid configuration mode.

Various other configuration modes (distance mode, load & position mode, etc.) are included. Please select appropriate pressing modes based on the work item′ s pressing condition.

3. System architecture

3. System architecture

3-1. Power system

Models	100kg, 300kg, 500kg, 1000kg
Power specifications	AC single-phase three-wire 220V 50/60Hz, 10A
Models	3000kg, 5000kg
Power specifications	AC Three-phase three-wire＋ground 220V 50/60Hz, 30A

Notes:

1. Be sure to ground the machine casing to ensure operator safety.
2. Before powering up, clear any objects or work items on the machine to prevent danger or damage to the machine.

3-2. Before powering up

3-2-1. Start preparations

Check the below before installing the power.

【Standard type】

Check if the switch on the servo press′ s right side is at OFF. If at ON, switch it to OFF first.

【Unit type】

【Shared】

nsure the power cables are well connected.

Warn

Please check the voltage before turning on the power switch.
Excessive voltage will cause an electric shock or machine damage.

3-2-2. Switches

Emergency switch: Shuts down the motor. If switched during running, the machine must be rebooted.

Auto/connection selection button: Toggle between standalone operation or externally controlled operation.

Start: When running, press both the left and right buttons at the same time to perform recipe movements.

No fuse breaker (NFB): Machine power switch.

3-2-3. Power up

a. Make sure that the no fuse breaker (NFB) is positioned at ON.

b. Reset the emergency switch (turn clockwise until it pops up).

c. The system will now display the system standby screen (Fig. 3-2-1). Select an item from the screen to perform.

【Alarm history】: Machine alarm message history.

【I/O monitoring】: Monitor current machine IO condition.

【Initialize】: Motor repositioning.

【Manual Control】: Punch and load cell sensor test page.

Fig. 3-2-3-1

3-2-4. Operation outline

I. Under standby mode with power on:

A. Wait for repositioning.

B. Click on [Initialize] to reposition.

C. Click on [Auto control] to enter the automated control page.

D. Click on [Change recipe] to change the production recipe to be used.
(Available when the auto control button is not pressed)

E. Click on [On] to begin automated production.

F. Use both hands to press down the left and right start buttons at the same time, and the selected recipe movement will begin.

II. Change recipe
   A. When auto control is not running, click directly on [Change recipe] on the auto control page to make changes.
   B. When auto control is running, first click on [On] to return the program to standby mode, and then click on [Change recipe] to change the recipe.

III. Modify recipe
   A. When auto control is not running, click directly on [Home] on the auto control page to return to the homepage, and then click [Movement recipe overview] to edit and modify the recipe.
   B. When auto control is running, click on [On] to return the program to standby mode before clicking [Home] to return to the homepage, and then click [Movement recipe overview] to edit and modify the recipe.

3-2-5. Error message occurrence

When an error message occurs, the machine will automatically enter stop mode. After fixing the issue, click [Retry] on the screen or press retry to cancel the error. If motor or load cell sensor module alarms cannot be cancelled, remove the back cover to check the motor drive′ s own alarm message. Record the message and try powering off and rebooting to see if it can be cancelled. If the same problem occurs often, check the recipe configuration. If the configuration is correct, contact the manufacturer′ s customer service for help.

3-2-6. I/O monitoring

Check the input or manage output based on the I/O table.

Note **To avoid danger, keep a distance until the punch ceases movement.**

4. System display introduction

4. System display introduction

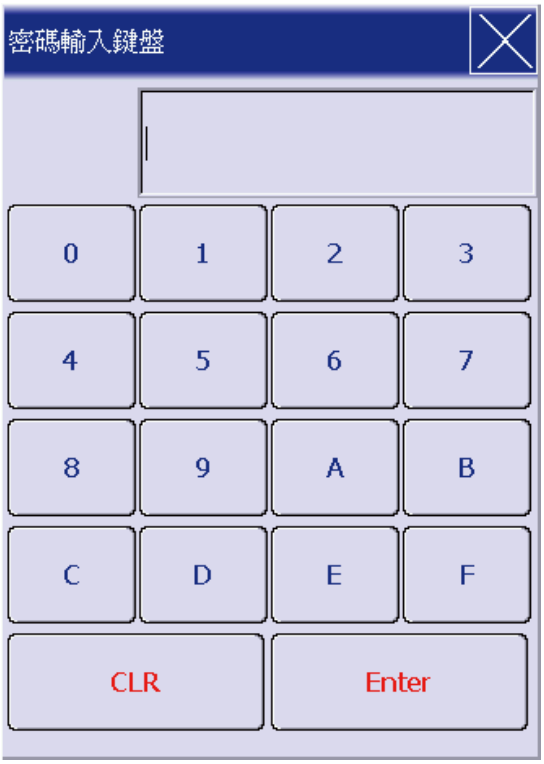
4-1. Main screen introduction

Fig. 4-1-1

A.	Access	Select machine operation access. For engineers: 1111
B.	Shift	Click to select work shift
C.	Log out	Log out from the accessed operator status
D.	Automatic control	Click to enter the auto control screen
E.	Recipe table	Click to enter the recipe selection and editing page. Only engineers are authorized to edit recipes
F.	Alarm history	Click to view and clear machine error alarm history
G.	Initialize	Click to initiate the motor and associated machine operation parameters
H.	Manual control	Click to enter the manual motor control page
I.	Load cell calibration	Click to enter the load cell calibration page. Engineer status required for authorization
J.	I/O monitor	Enter I/O monitoring screen
K.	Parameter	Click to set the machine motor to home and to set general parameters

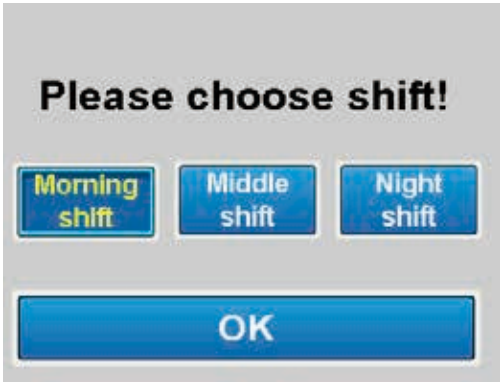
4-2. Access

Password insertion screen:



4-3. Shift

Shift selection screen:



1. **Select the shift to be changed into**
2. **Click OK**

4-4. Automatic control page

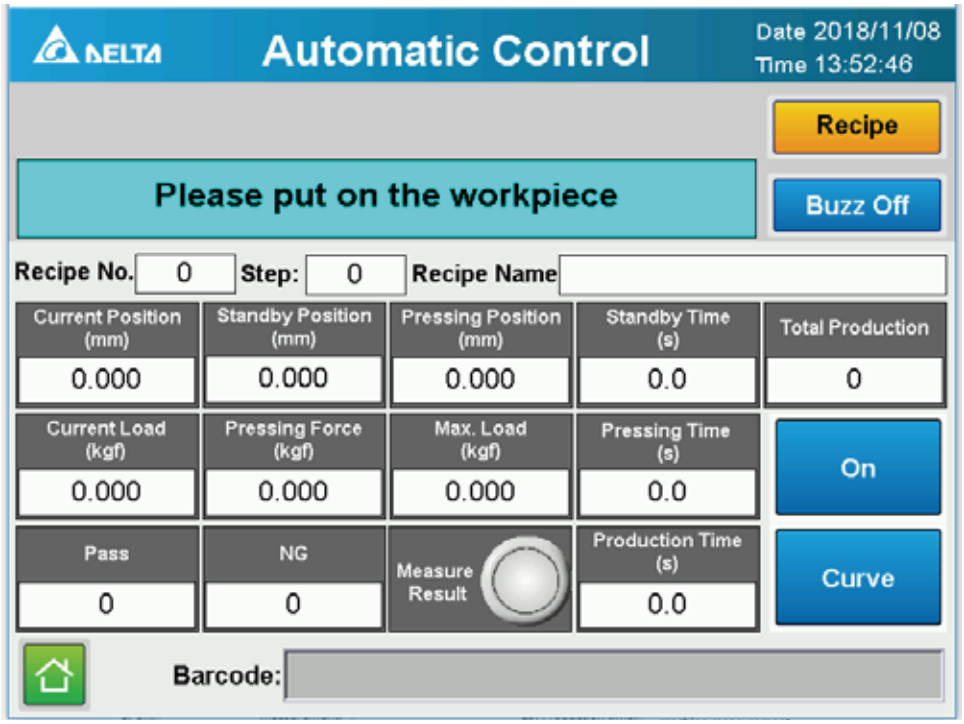
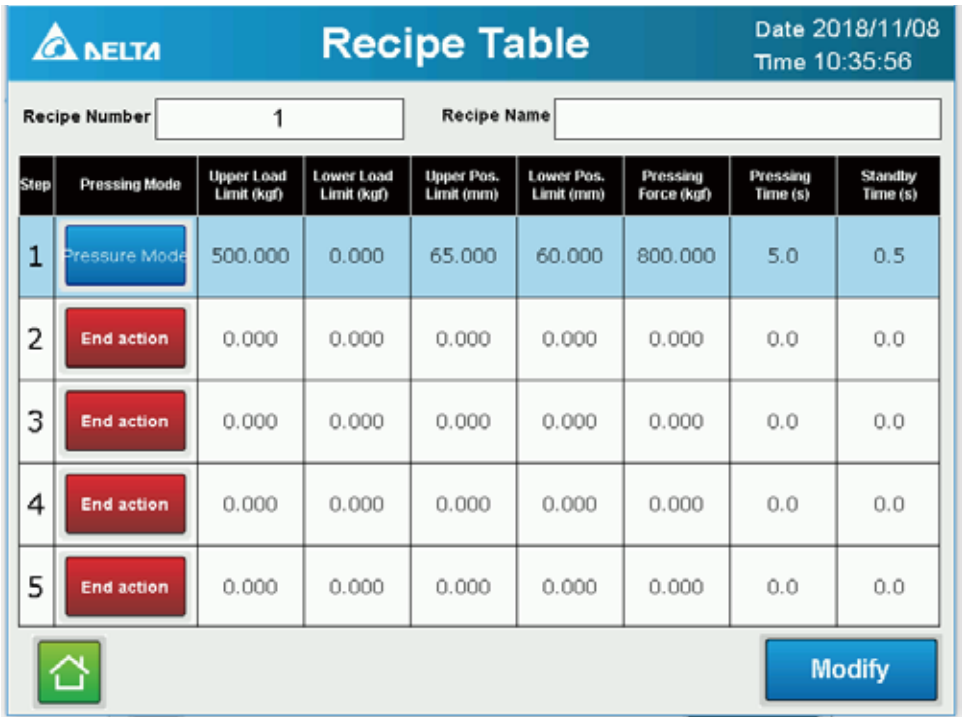


Fig. 4-4-1

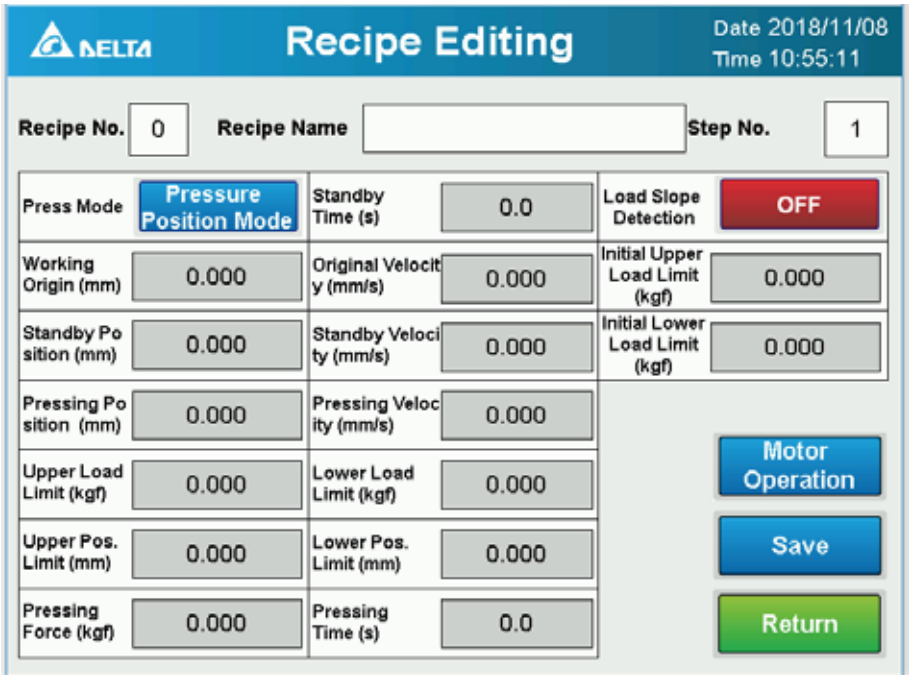
1. Recipe	Recipe may be changed when machine is not running	12. Recipe No.	Selected work recipe
2. Home	May return to index homepage when machine is not running	13. Standby position	The recipe's preheating position
3. Buzzer off	Turn off buzzer indication	14. Recipe name	Select recipe name
4. Curve	Display load curve during measurement	15. Pressing Time	Pressing time count
5. Step	Step in target recipe movement	16. Pass	Pass count of measurements
6. Max. load	Maximum load generated by machine during the procedure	17. Pressing position	Final pressing position reached
7. Current Position	Current actual position of motor	18. Measure Result	Display measurement results
8. On	After selecting a recipe, click Start to await measurement.	19. Production time	Time required for one machine measurement
9. Barcode	Barcode number for the current production item	20. NG	NG count of measurements
10. Standby time	Time when motor reaches preheating position	21. Total Production	Total production count for the machine
11. Pressing Force	Force at final pressing	22. Current load	The actual load value

4-5. Recipe overview



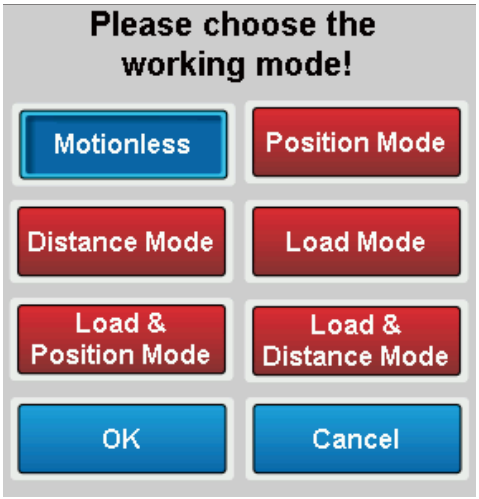
1.	Recipe number	Currently selected recipe number. Recipe number to be viewed may be edited
2.	Recipe name	Currently selected recipe name. Click to edit recipe name
3.	Step	Movement step for the current recipe
4.	Pressing mode	Movement mode for the current recipe step
5.	Home	Return to the previous page before entering the recipe selection page
6.	Load	Displays only when using the auto control page and Change Recipe is selected
7.	Modify	Only modifiable when entered through the main screen movement recipe overview. Select the recipe step to be modified, and then click Modify to enter the modification page.

4-6. Recipe editing page



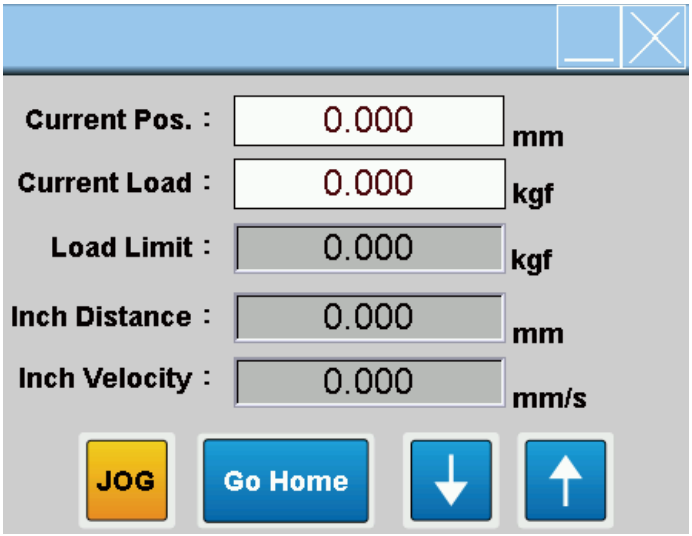
1. Recipe number	Number of recipe in modification	13. Upper load limit	Maximum load setting that the work item may bear
2. Recipe name	Name of recipe in modification	14. Upper position limit	The work item's final upper position limit setting after pressin
3. Step No.	Number of recipe procedure in modification	15. Lower position limit	The work item's final lower position limit setting after pressing
4. Press mode	Select movement mode to change into	16. Pressing force	Target pressing force
5. Standby Time	Standby time after the motor starts and moves to standby position	17. Pressing time	Pressing and force retention time for the work item
6. Working origin	Working origin to be reached once recipe is on	18. Motor operation	Simple operation of motor movement
7. Standby position	Safe position near the work item to be reached before pressing starts	19. Save	Save the configured movement steps and recipe
8. End position	Actual position when pressing ends	20. Return	Return to movement recipe overview
9. Original velocity	Motor velocity when moving to working origin	21. Load slope detection	Choose whether to turn on load slope detection
10. Standby velocity	Motor velocity when moving to standby position	22. Initial upper load limit	Set the maximum load that the work item may initially bear
11. Pressing velocity	Pressing velocity when motor is in operation	23. Initial lower load limit	Minimum load setting that the work item may initially bear
12. Lower load limit	Minimum load setting that the work item may bear		

4-7. Movement mode selection screen



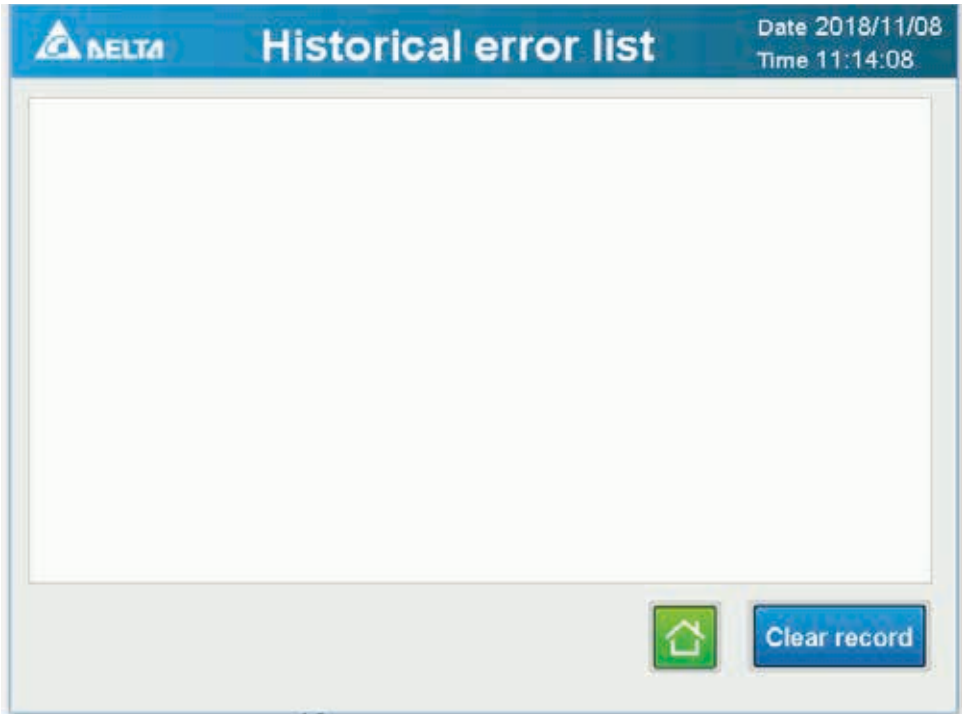
There are five pressing mode options: position, distance, load, load & position, and load & distance. Select and click OK, or click Cancel to remove selection.

4-8. Motor operation



1.	Current Position	Current position of the motor			
2.	Current Load	Current load as measured by the load cell sensor			
3.	Load Limit	When inching, the motor cannot continue moving down if the load generated is higher than this setting			
4.	Inch Distance	Motor inching distance			
5.	Inch Velocity	Motor inching or jogging velocity			
6.		Returnmotor to mechanical origin	8.		Motor movement down
7.		Select motor jogging (JOG) or inching (INCH)	9.		Motor movement up

4-9. Alarm history



Display machine’ s alarm history report.

Clear records: May clear alarm history report.

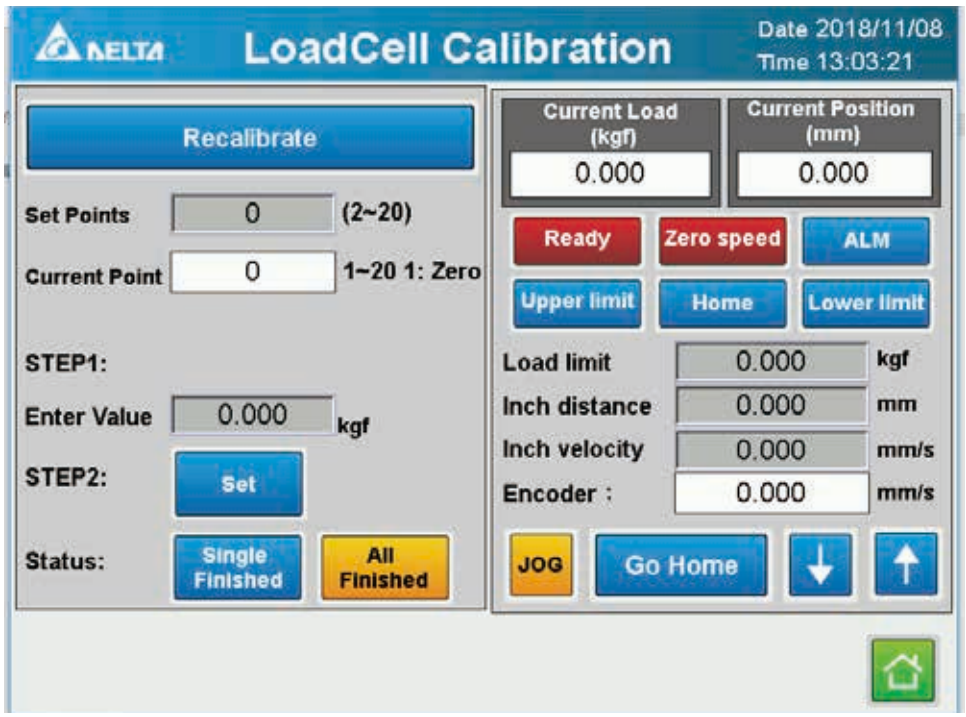
Home: Return to machine homepage.

4-10. Manual control

1.	Response time	Display current load cell module scan frequency setting
2.	Eigenvalues	Display eigen values of the load cell sensor currently in use
3.	Load limit	Display current load cell module upper load limit setting
4.	Current Position	Current position of the motor
5.	Current Load	Current load reading by the load cell sensor
6.	Encoder	Current backtracking position of the motor
7.	Load limit	When inching, the motor cannot continue moving down if the load generated is higher than this setting
8.	Inching distance	Motor inching distance
9.	Inching velocity	Motor inching or jogging velocity

Ready	Motor ready signal		Motor movement down	JOG	Select motor jogging (JOG) or inching (INCH)
Go Home	Return motor to mechanical origin		Motor movement up	ALM	Motor error alarm signal
ALM RST	Clear motor error		Click to return to homepage	Zero Speed	Motor stop signal
Upper limit	Motor upper limit signal	Home	Motor home signal	Lower limit	Motor lower limit signal

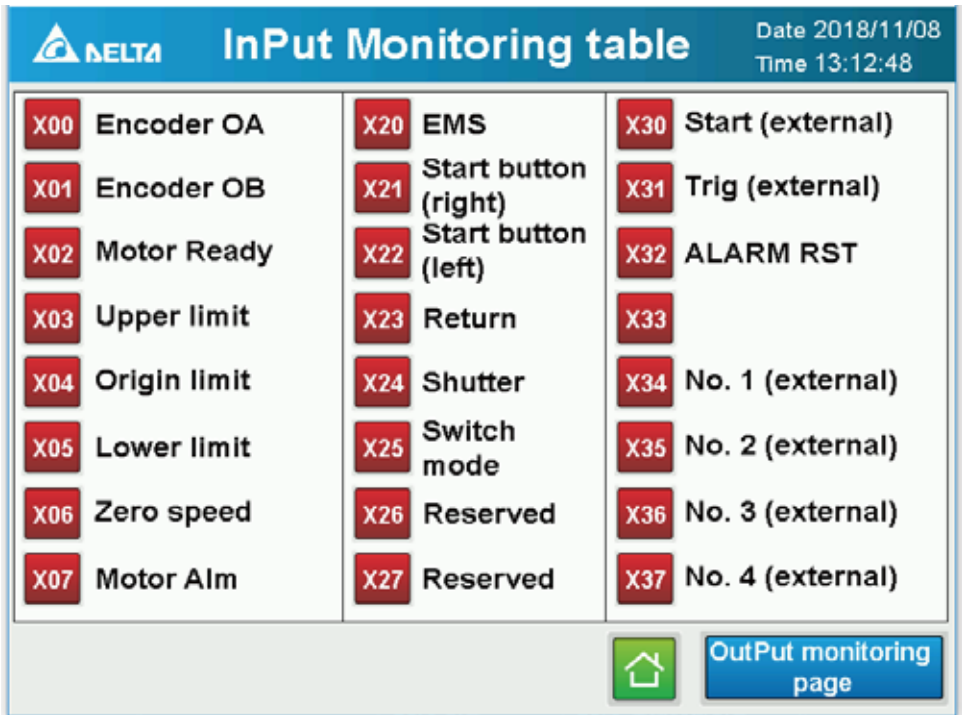
4-11. Load cell calibration

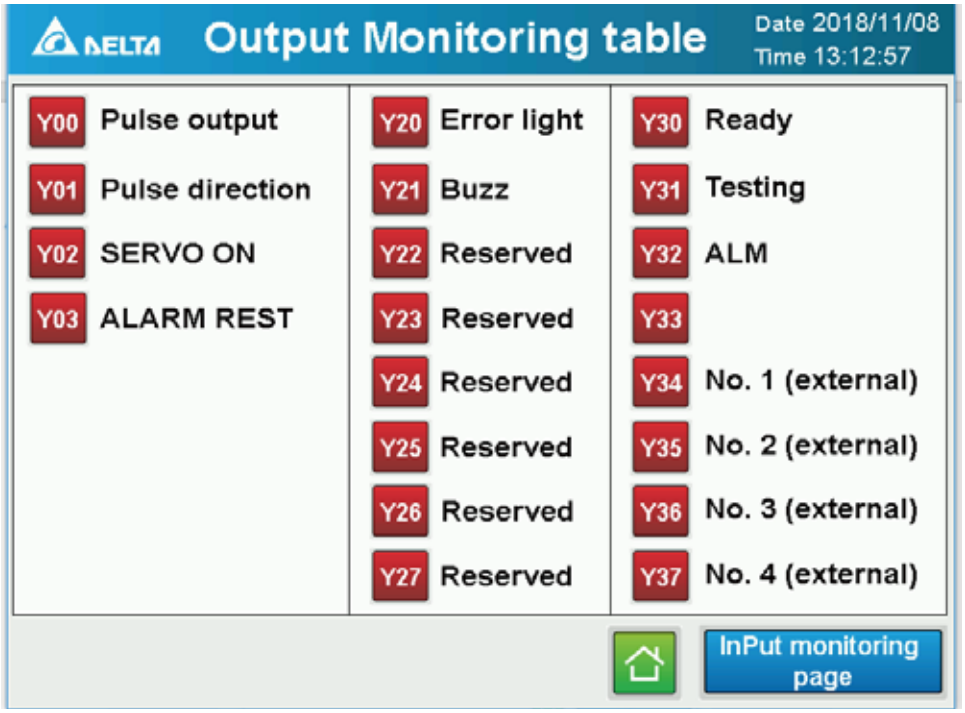


1.	STEP 1: Enter value	Enter the correct load corresponding to the current calibration point
2.	Current point	Position under calibration
3.	Set points	Enter the number of points to be divided into and calibrated. (2~20)
4.	Current Position	Current position of the motor
5.	Current Load	Current load reading by the load cell sensor
6.	Encoder	Current backtracking position of the motor
7.	Load limit	When inching, the motor cannot continue moving down if the load generated is higher than this setting
8.	Inching distance	Motor inching distance
9.	Inching velocity	Motor inching or jogging velocity

Recalibrate	Click to start load cell calibration		Motor movement down	JOG	Select motor jogging (JOG) or inching (INCH)
Set	Click after confirming current load to save in memory		Motor movement up	ALM	Motor error alarm signal
Single Finished	Displays an equals sign after completing single point calibration		Click to return to homepage	Zero speed	Motor stop signal
All Finished	Displays an equals sign after completing calibration	Go Home	Return motor to mechanical origin	Lower limit	Motor lower limit signal

4-12. I/O monitoring

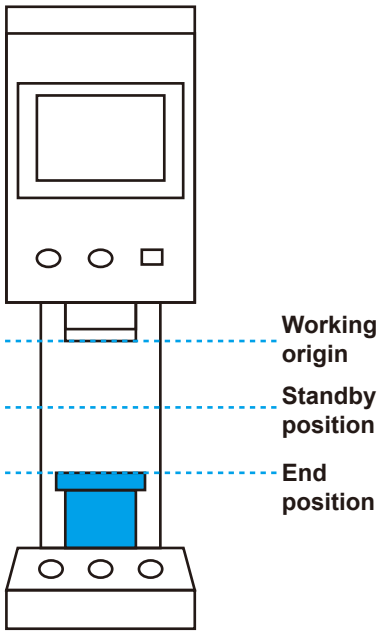



Output Monitoring table
Date 2018/11/08
Time 13:12:57
Y00 Pulse output
Y01 Pulse direction
Y02 SERVO ON
Y03 ALARM REST
Y20 Error light
Y21 Buzz
Y22 Reserved
Y23 Reserved
Y24 Reserved
Y25 Reserved
Y26 Reserved
Y27 Reserved
Y30 Ready
Y31 Testing
Y32 ALM
Y33
Y34 No. 1 (external)
Y35 No. 2 (external)
Y36 No. 3 (external)
Y37 No. 4 (external)
InPut monitoring page

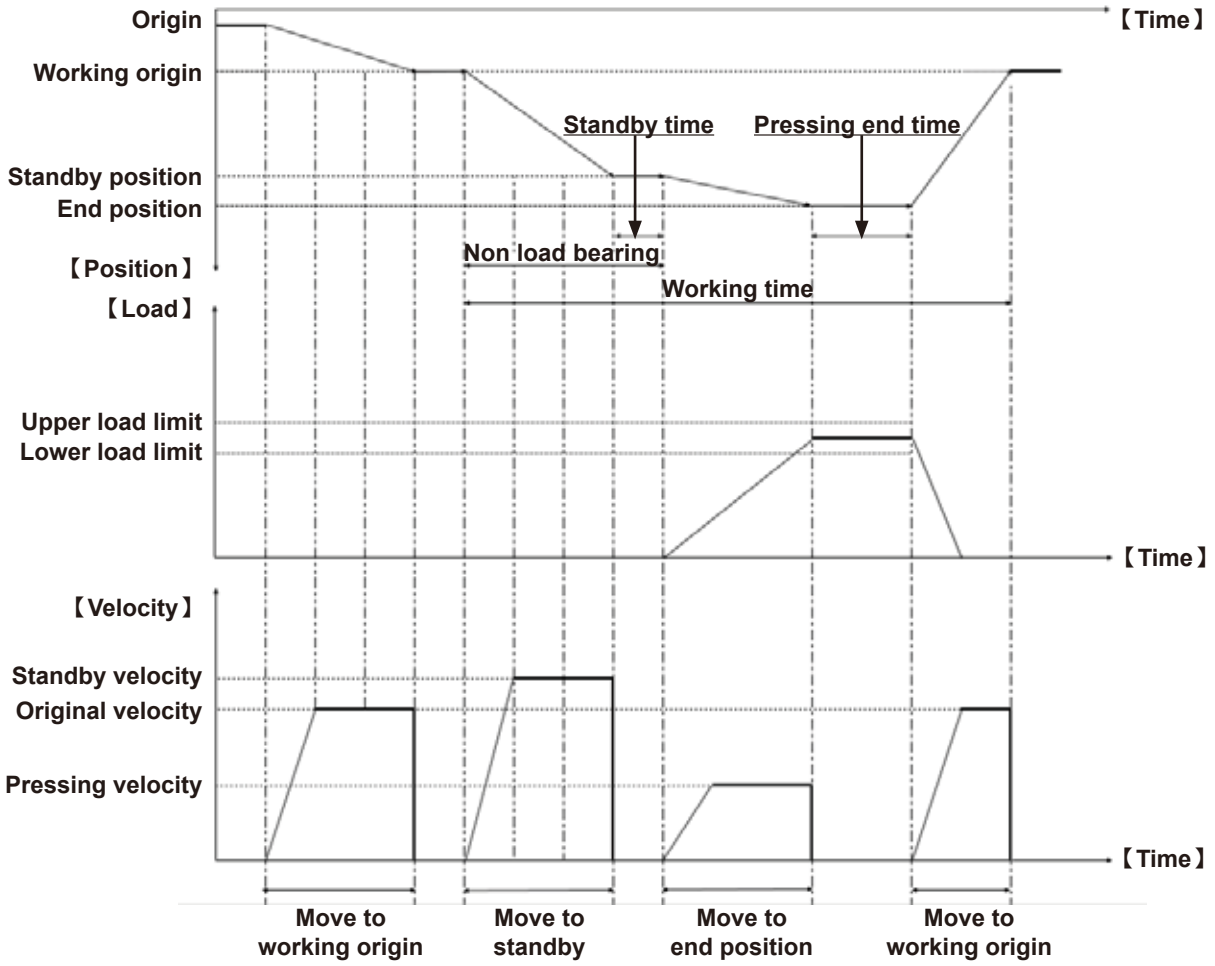
5. Movement mode introduction

5. Movement mode introduction

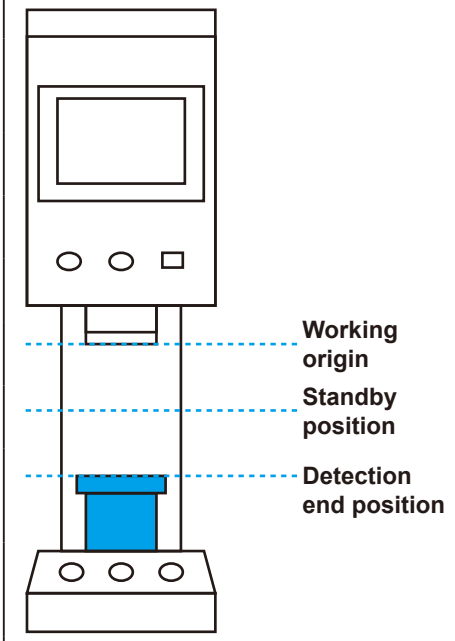
5-1. Position Mode



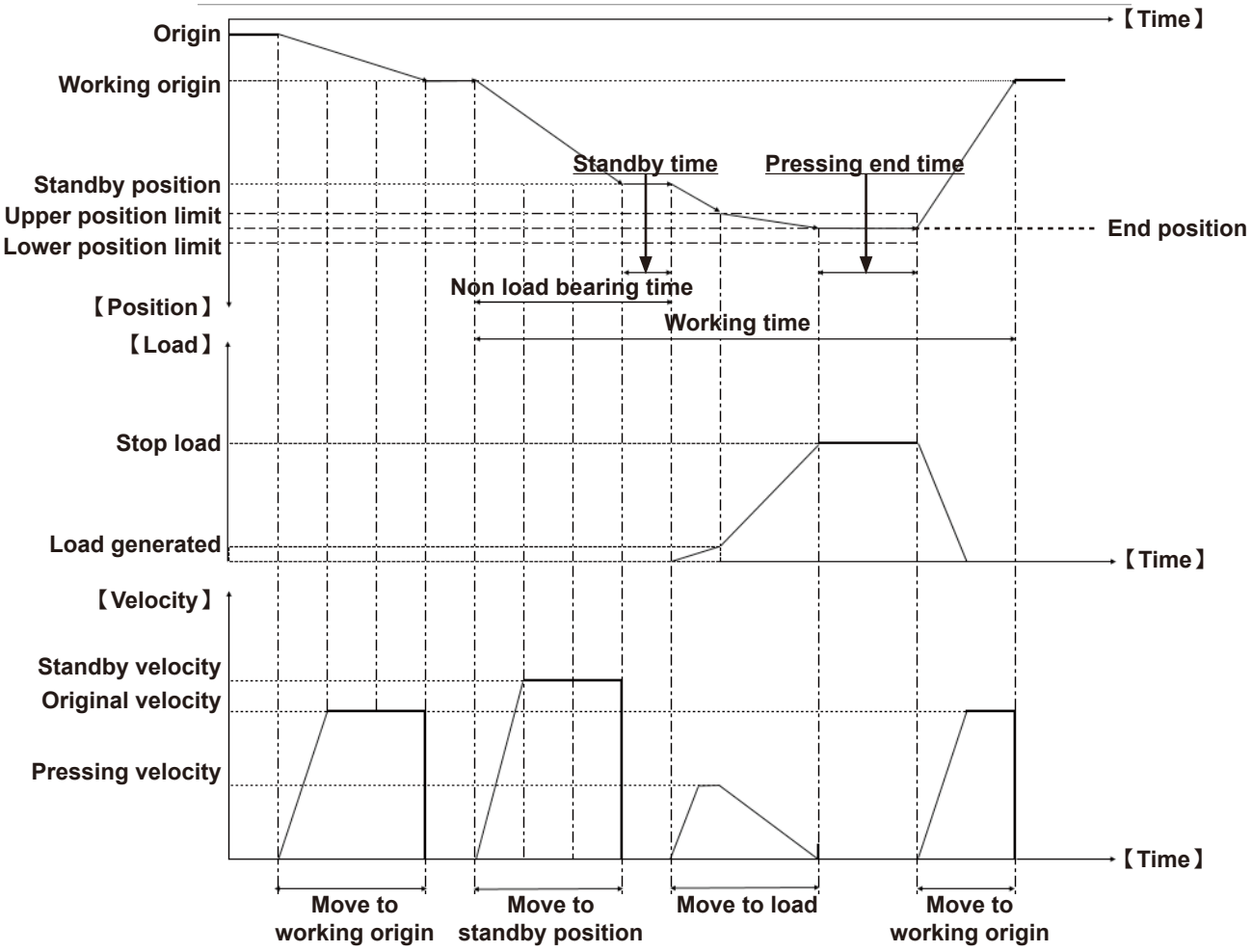
01. Working origin	Standby position during operation (position where the punch returns to)
02. Standby position	Position where the non load bearing standby velocity changes into pressing velocity
03. End position	Position at the end of pressing
04. Original velocity	Velocity of the punch returning to standby position
05. Standby velocity	Non load bearing punch operation velocity
06. Pressing velocity	Velocity when the punch starts pressing
07. Standby Time	Standby time until the punch continues pressing after it reaches standby position
08. Upper load limit	Maximum product generated load value within acceptable load range after pressing ends
09. Lower load limit	Minimum product generated load value within acceptable load range after pressing ends
10. Pressing Time	Force maintaining time after pressing ends. Motor will return to standby position when this time is up.



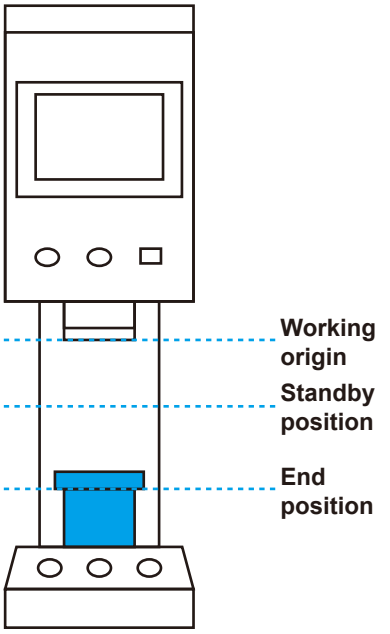
5-2. Load Mode



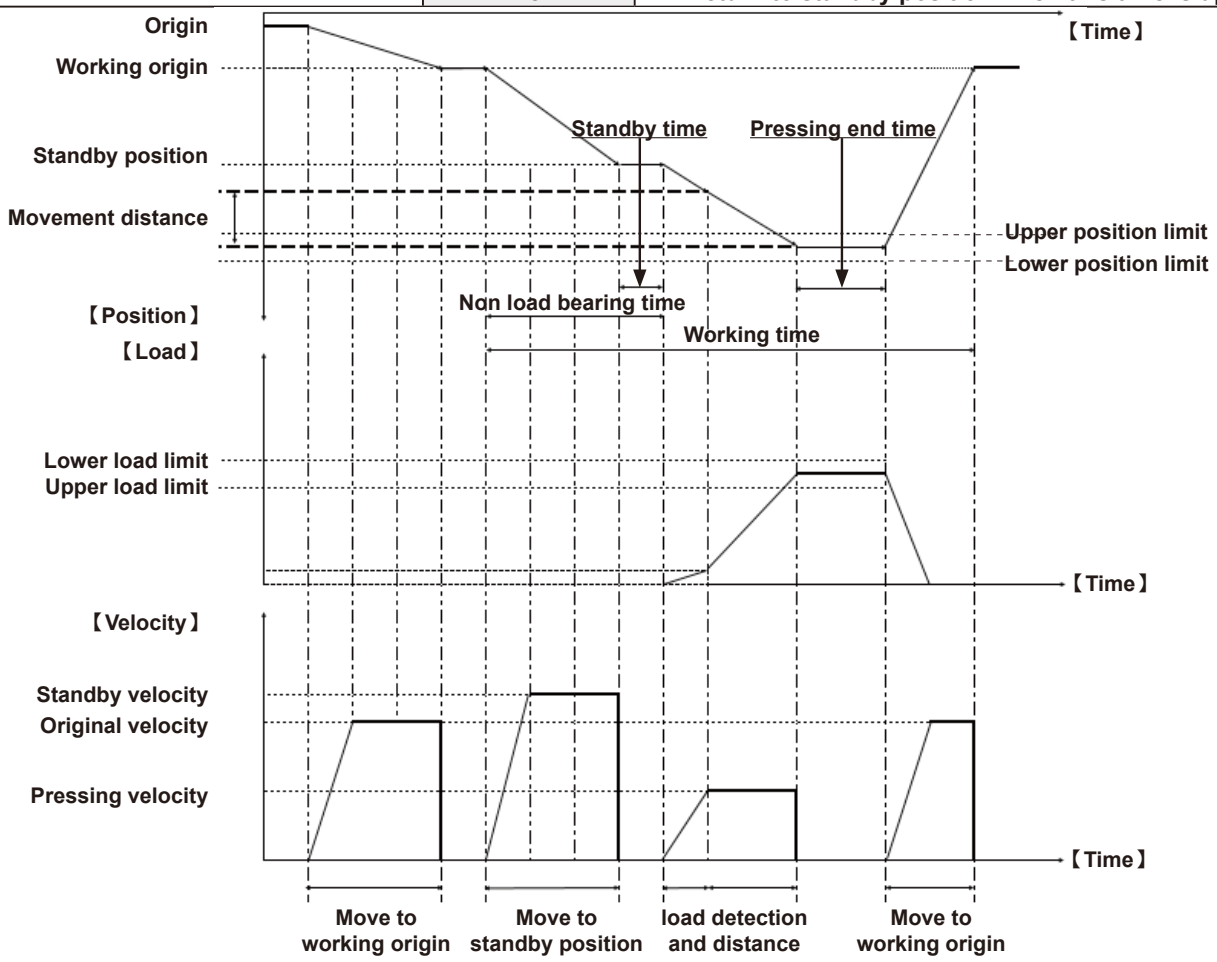
01. Working origin	Standby position during operation (position where the punch returns to)
02. Standby position	Position where the non load bearing standby velocity changes into pressing velocity
03. Detection end position	End position of load detection (if no load at this position, the punch will return directly to standby position).
04. Original velocity	Velocity of the punch returning to standby position
05. Standby velocity	Non load bearing punch operation velocity
06. Pressing velocity	Velocity when the punch starts pressing
07. Standby time	Standby time until the punch continues pressing after it reaches standby position
08. Stop load	Punch will stop drive when this load is detected
09. Upper position limit	Maximum product-to-motor position within acceptable range after pressing ends
10. Lower position limit	Minimum product-to-motor position within acceptable range after pressing ends
11. Pressing Time	Force maintaining time after pressing ends. Motor will return to standby position when this time is up



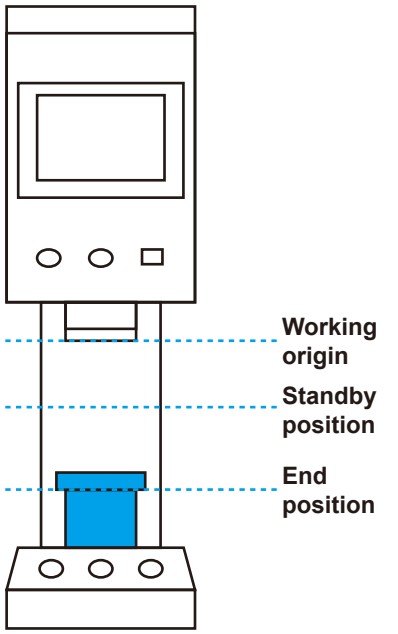
5-3. Distance Mode



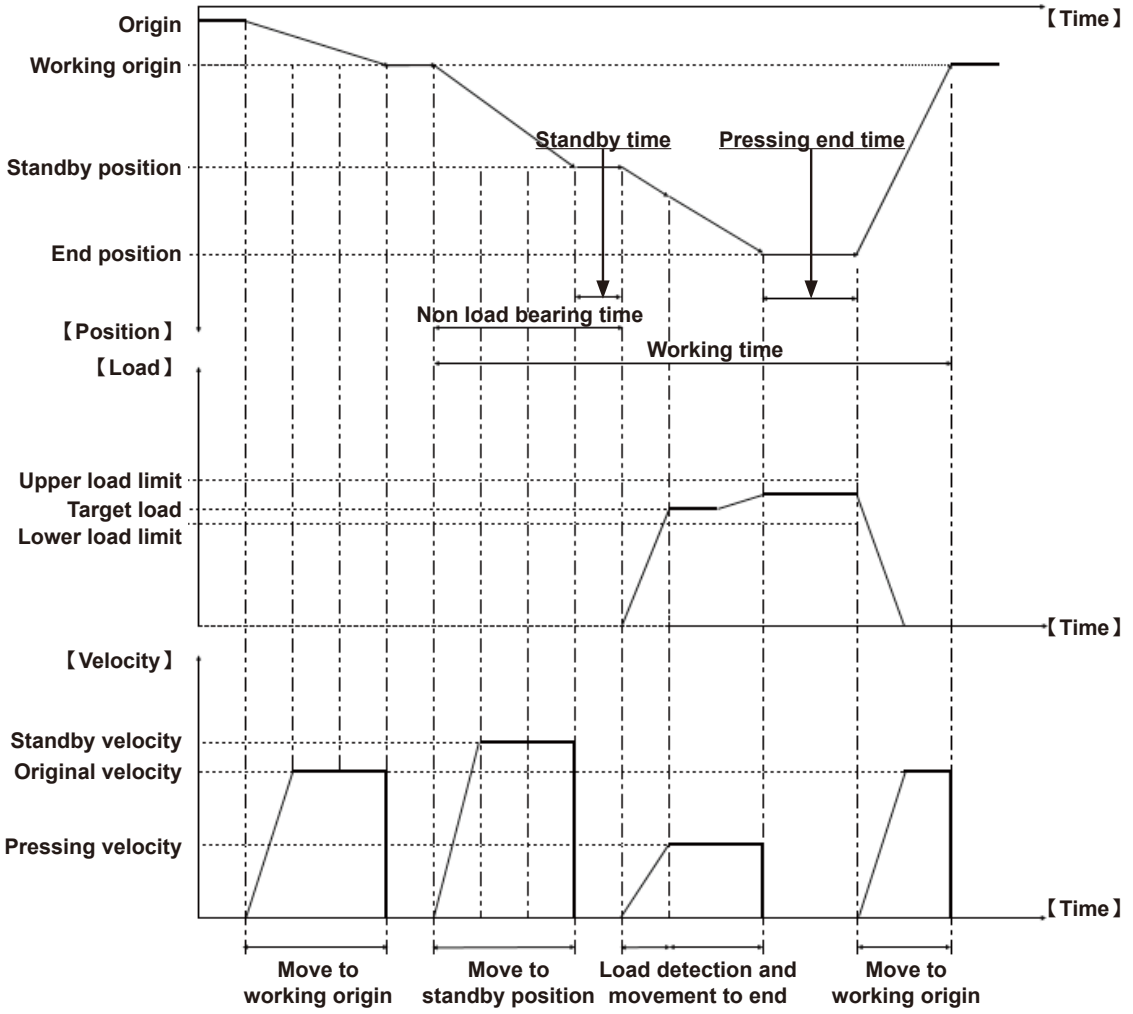
01. Working origin	Standby position during operation (position where the punch returns to)
02. Standby position	Position where the non load bearing standby velocity changes into pressing velocity
03. End position	Distance setting for relative movement once load generation is detected
04. Original velocity	Velocity of the punch returning to standby position
05. Standby velocity	Non load bearing punch operation velocity
06. Pressing velocity	Velocity when the punch starts pressing
07. Standby Time	Standby time until the punch continues pressing after it reaches standby position
08. Lower position limit	Minimum product-to-motor position within acceptable range after pressing ends
09. Upper load limit	Maximum product generated load value within acceptable load range after pressing ends
10. Lower load limit	Minimum product generated load value within acceptable load range after pressing ends
11. Upper position limit	Maximum product-to-motor position within acceptable range after pressing ends. (If no load generation detected when motor reaches this position, punch will return directly to standby position)
12. Pressing Time	Load maintaining time after pressing ends. Motor will return to standby position when this time is up



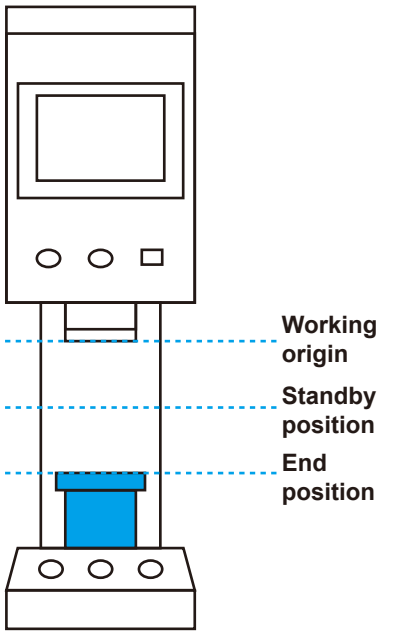
5-4. Load & Position Mode



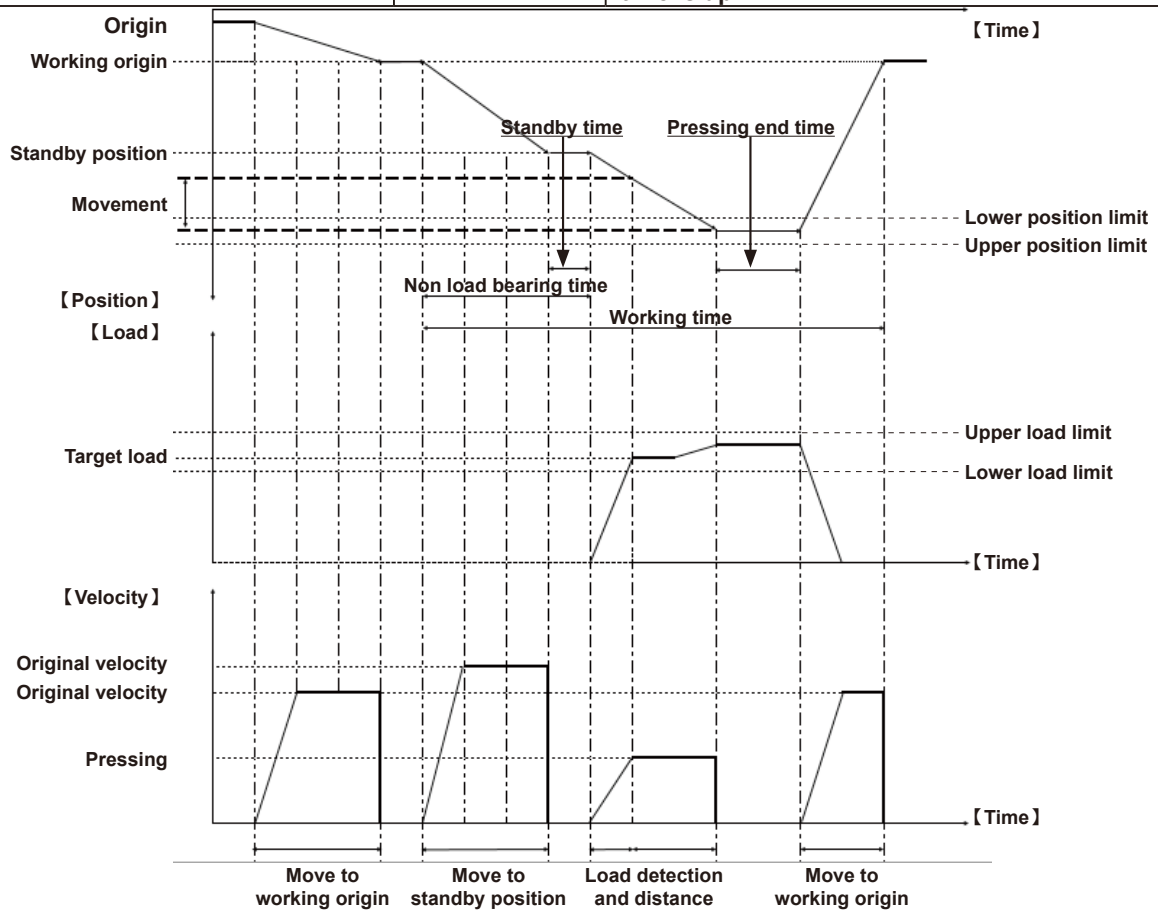
01. Working origin	Standby position during operation (position where the punch returns to)
02. Standby position	Position where the non load bearing standby velocity changes into pressing velocity
03. End position	End position setting for absolute movement once detected that the load is reached
04. Original velocity	Velocity of the punch returning to standby position
05. Standby velocity	Non load bearing punch operation velocity
06. Pressing velocity	Velocity when the punch starts pressing
07. Standby Time	Standby time until the punch continues pressing after it reaches standby position
08.Target load	Target load for start of pressing
09. Upper load limit	Maximum product generated load value within acceptable load range after pressing ends
10. Lower load limit	Minimum product generated load value within acceptable load range after pressing ends
11. Pressing Time	Force maintaining time after pressing ends. Motor will return to standby position when this time is up



5-5. Load & Distance Mode



01. Working origin	Standby position during operation (position where the punch returns to)
02. Standby position	Position where the non load bearing standby velocity changes into pressing velocity
03. End position	End position setting for relative movement once the load is reached
04. Original velocity	Velocity of the punch returning to standby position
05. Standby velocity	Non load bearing punch operation velocity
06. Pressing velocity	Velocity when the punch starts pressing
07. Standby Time	Standby time until the punch continues pressing after it reaches standby position
08. Target Load	Target load for start of pressing
09. Upper position limit	Maximum product-to-motor position within acceptable range after pressing ends. (If no load generation detected when motor reaches this position, punch will return directly to standby position)
10. Lower position limit	Minimum product-to-motor position within acceptable range after pressing ends
11. Upper load limit	Maximum product generated load value within acceptable load range after pressing ends
12. Lower load limit	Minimum product generated load value within acceptable load range after pressing ends
13. Pressing Time	Force maintaining time after pressing ends. Motor will return to standby position when this time is up



6. Load cell calibration process

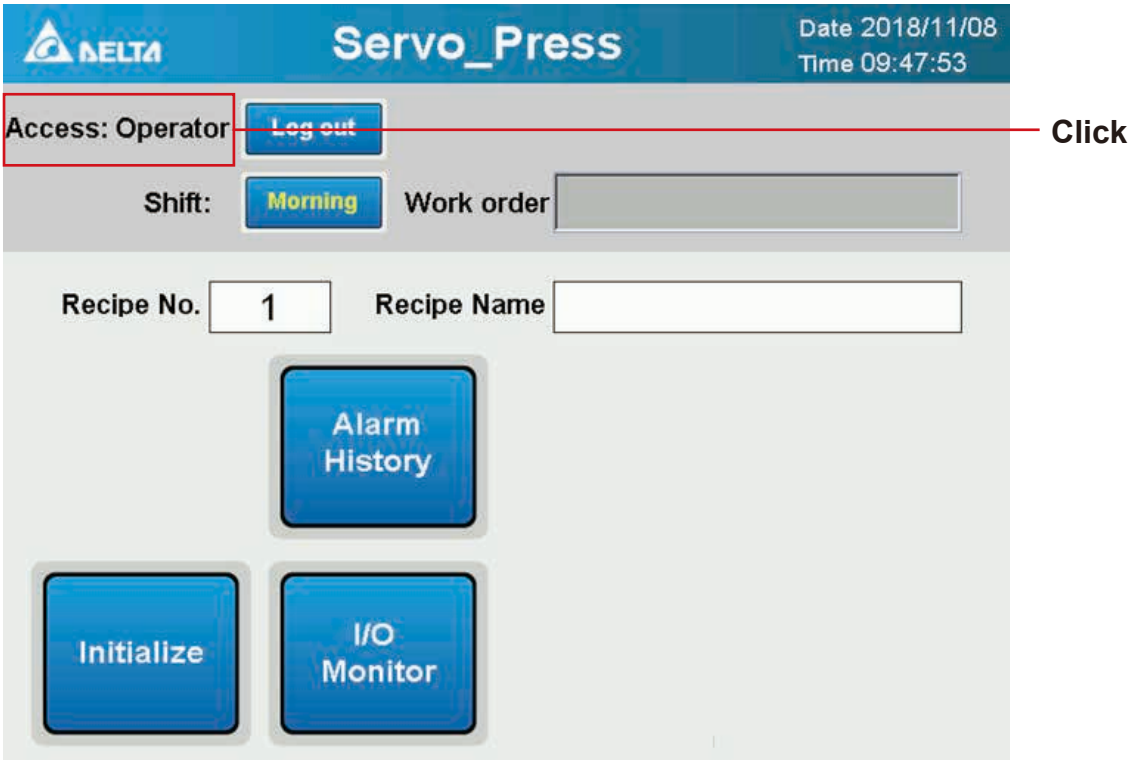
6. Load cell calibration process

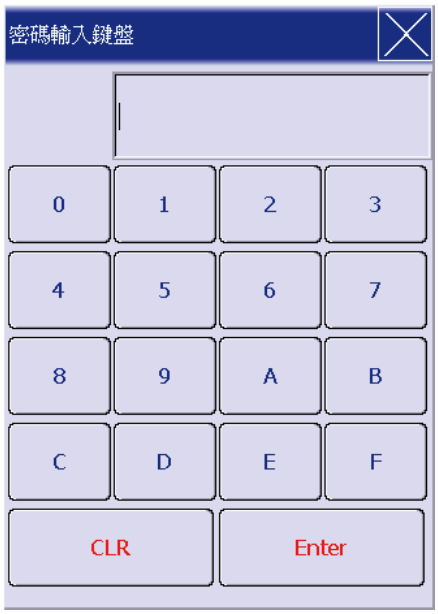
6-1. Calibration steps

A. Click on Access and enter engineer access code
B. Click on Calibration to enter the page
C. Enter 2-20 points for [Set calibration points]
D. Click [Home] to return the motor to the mechanical origin
E. Click [Reset] to start calibrating the load cell
F. Ensure that there are no items pressed under the punch, and then click on [Set] to zero the load cell
G. Once [Single Finished] lights up, start operating the motor to push down the below load cell calibration tool for measurement
H. When the load cell calibration tool reaches a stable required load enter this value into
I. [Step1: Enter numerical value] and click [Set]
J. Repeat step H each time [Single Finished] lights up, until [Calibration Finished] lights up. The calibration is now done

6-2. Calibration example

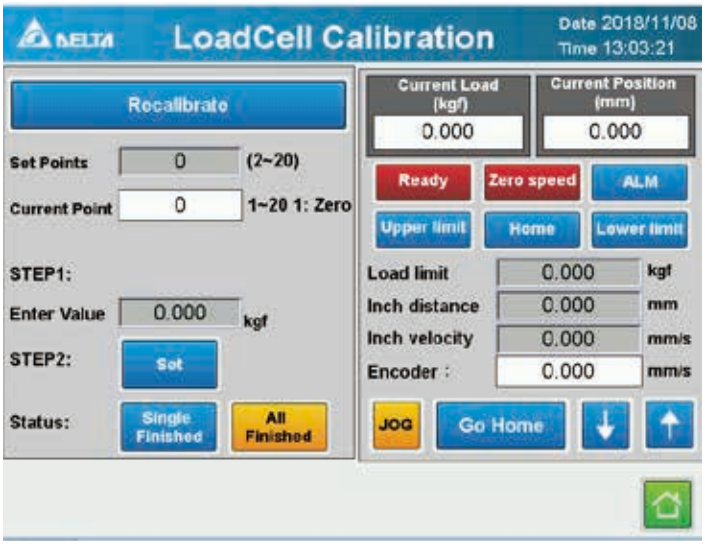
A. Click on Access and enter engineer access code



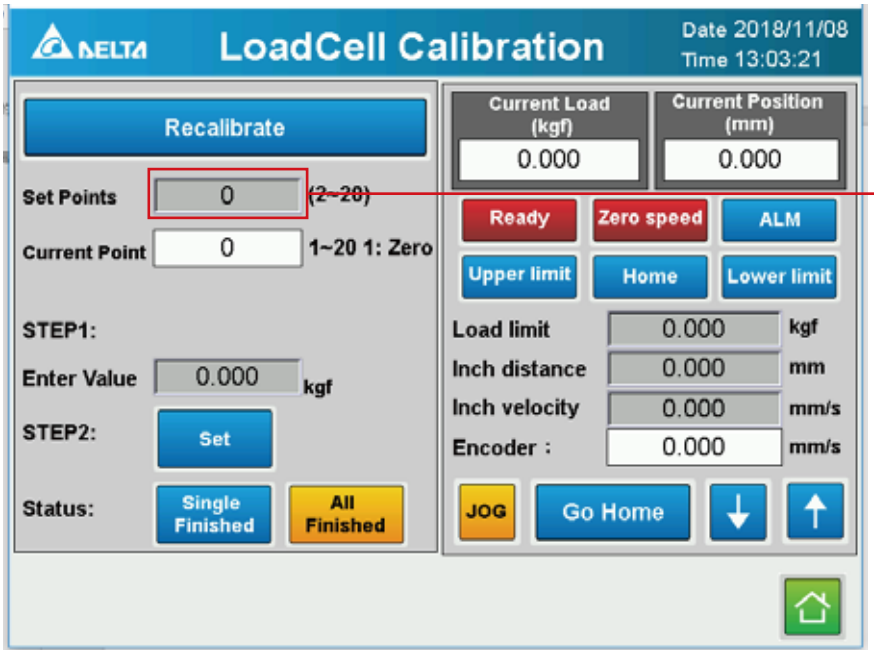


1. Enter engineer password (Default: 1111)
2. Once entered, press [Enter]
3. If the password is correct, the below screen will be displayed.

B. Click on Calibration to enter the page



C. Enter 2-20 points for [Set calibration points]

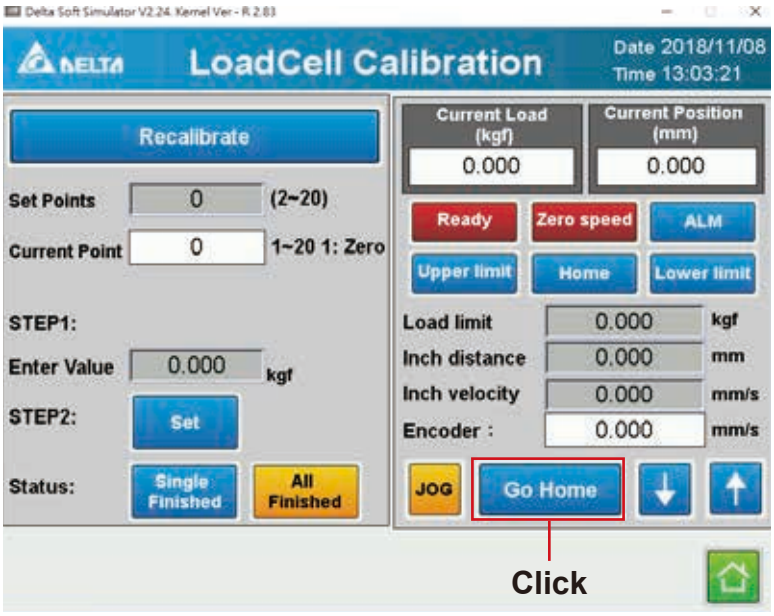


The below screen will be displayed

Enter the number of points to divide into. Once entered, press [Enter].

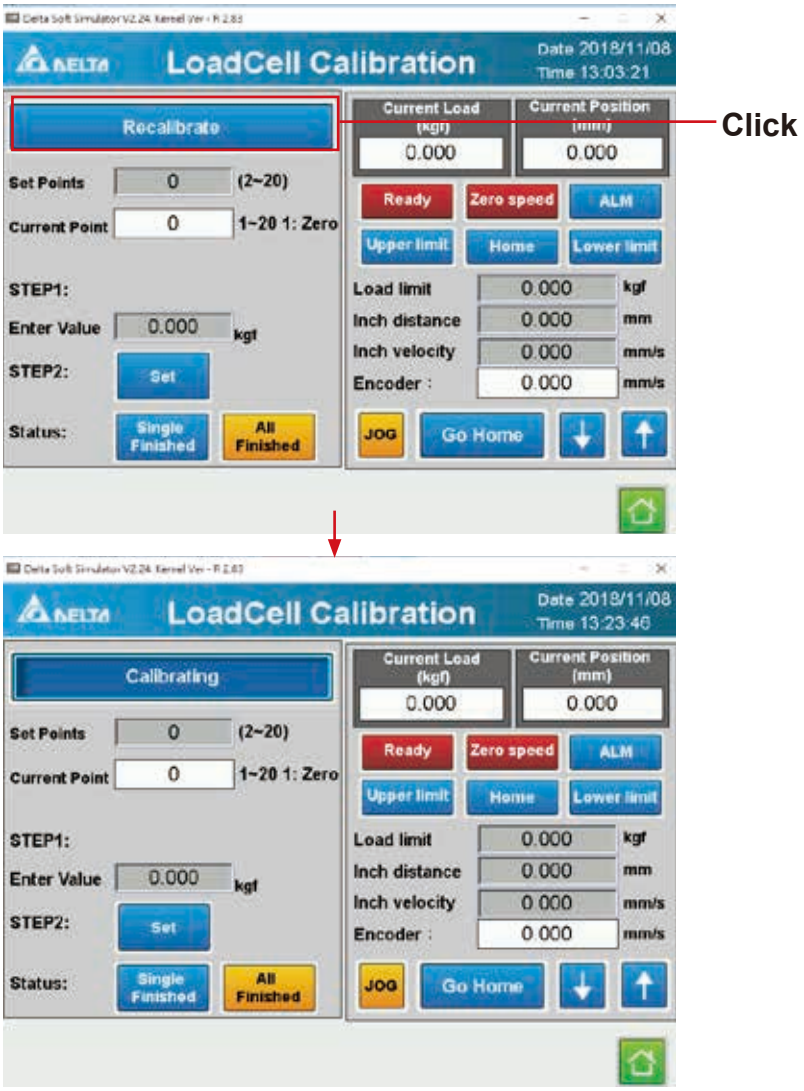
Exp: The 1-ton model has a maximum load of 1000kg. For 5 calibration points, the load curve will be divided at 200kg intervals. The more points, the smaller intervals.

D. Click [Home] to return the motor to the mechanical origin

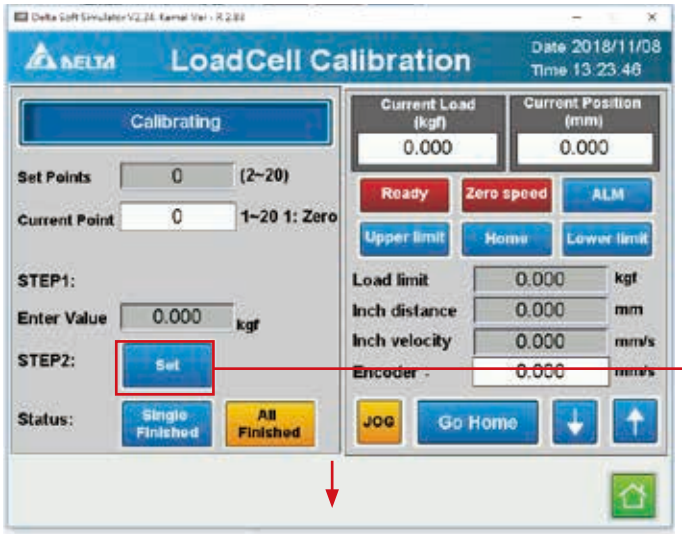


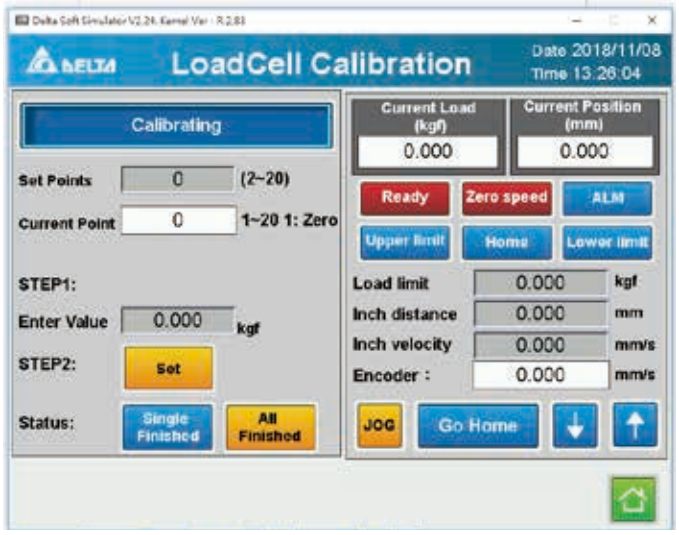
Ensure that [Encoder] and [Position] are both 0

E. Click [Reset] to start calibrating the load cell

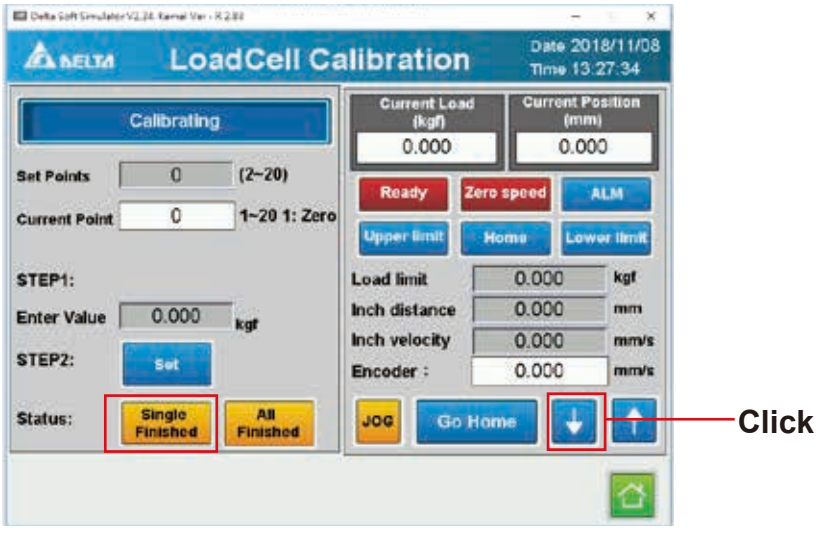


F. Ensure that there are no items pressed under the punch, and then click on [Set] to zero the load cell.

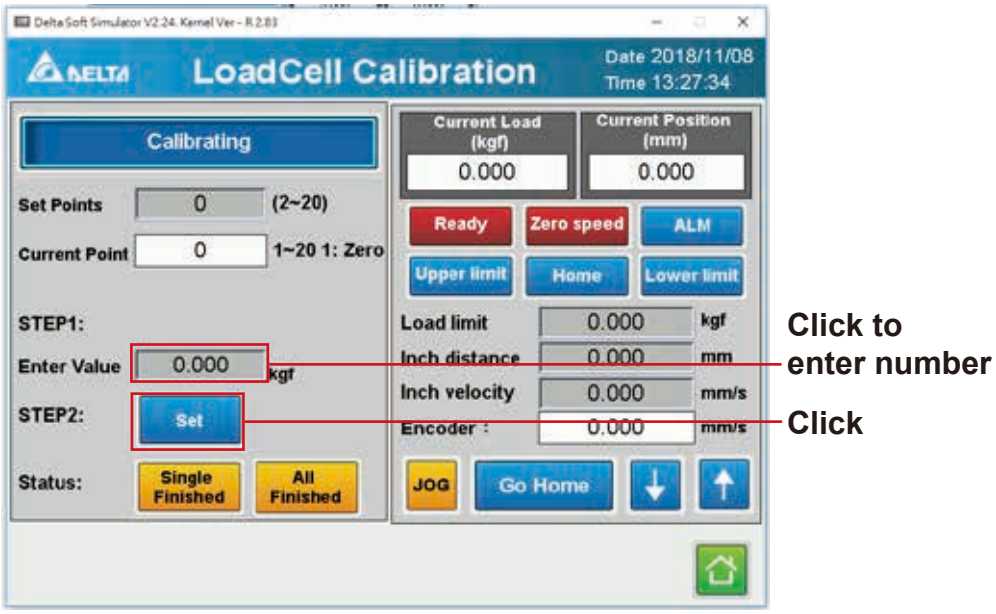




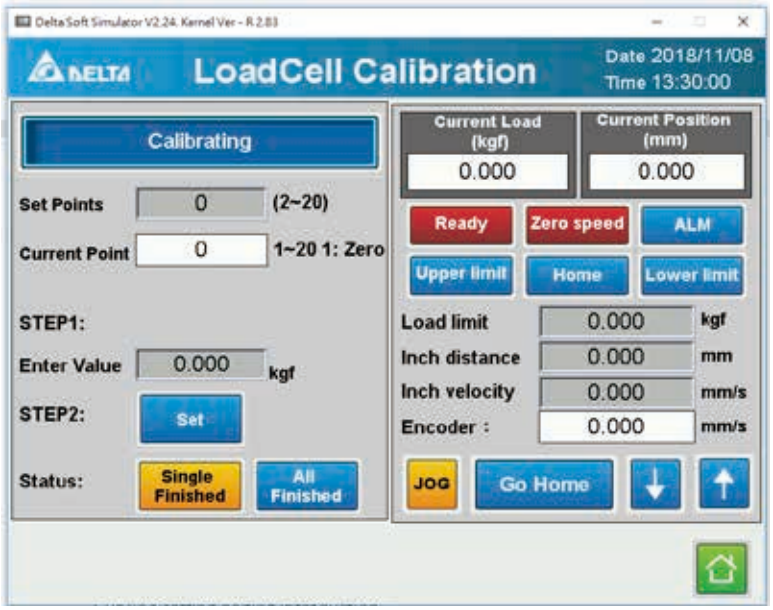
G. Once [Single Finished] lights up, start operating the motor to push down the below load cell calibration tool for measurement.



H. When the load cell calibration tool reaches a stable required load, enter this value into [Step1: Enter numerical value] and click [Set].



I. Repeat steps g to h each time [Single Finished] lights up, until [All Finished] lights up. The calibration is now done.



7. Recipe setting editing introduction

7. Recipe setting editing introduction

7-1. Recipe setting steps

A. Click on Access and enter engineer access code.

B. Click [Movement recipe overview] to enter the page.

C. Select the [Recipe number] to modify.

D. Select the recipe step to be modified, and then click [Modify] to enter the modification page

E. Select a movement mode for the step:
[Motionless], [Position Mode], [Load Mode], [Distance Mode], [Load & Position Mode], and [Load & Distance Mode]

F. Select a mode and click OK, the page will display the values to be entered for that mode.

G. Click Save when all values are entered. The screen will jump back to the movement recipe overview page.

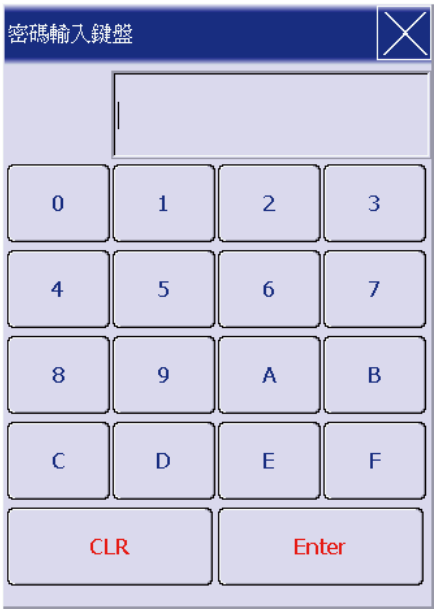
H. If addition of a subsequent step is required, select the next step and add it as per step d.

I. When all steps are confirmed, click [Back] to return to home or change the recipe number to continue editing.

Note: When the first and third steps have corresponding movement modes entered but the second step does not, the recipe will stop movement once the first step ends.

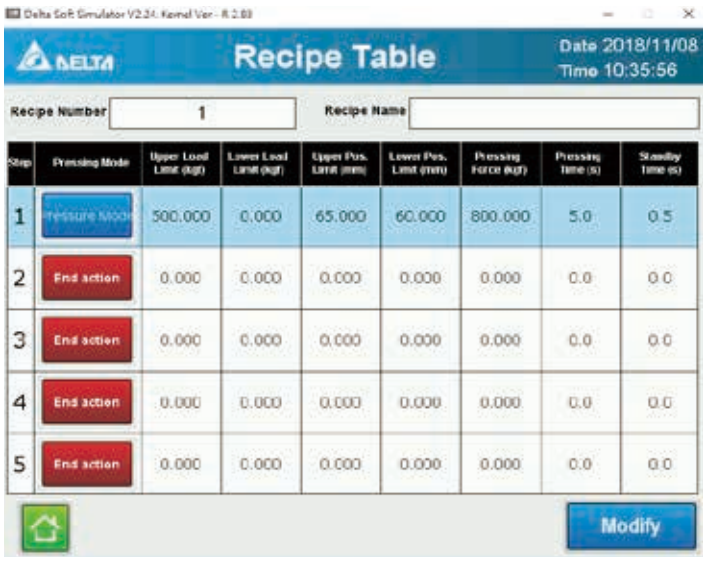
Calibration example:

A. Click on Access and enter engineer access code.

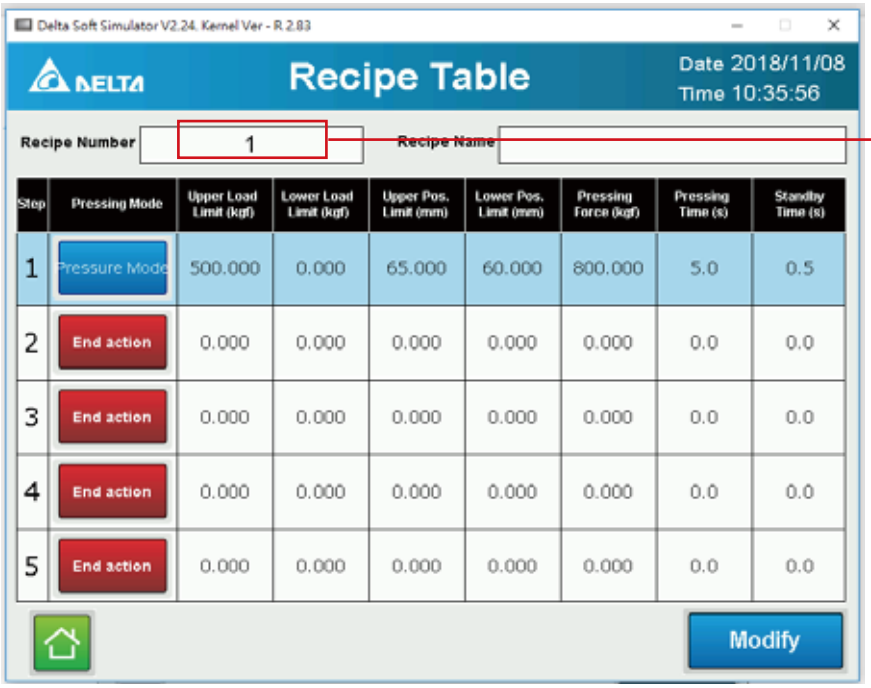


1. **Enter engineer password (Default: 1111)**
2. **Once entered, press [Enter] If the password is correct, the below screen will be displayed**

B. Click [Movement recipe overview] to enter the page.



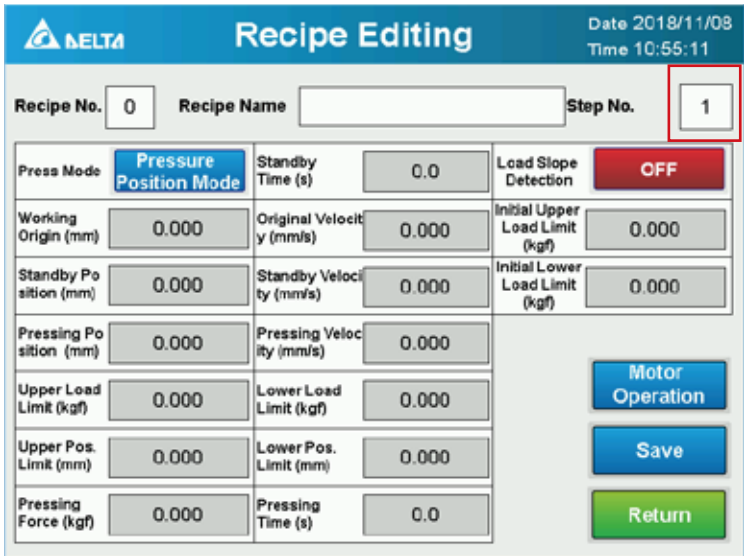
C. Select the [Recipe number] to modify.



Enter recipe number of 0-40 to modify
Once entered, press [Enter]

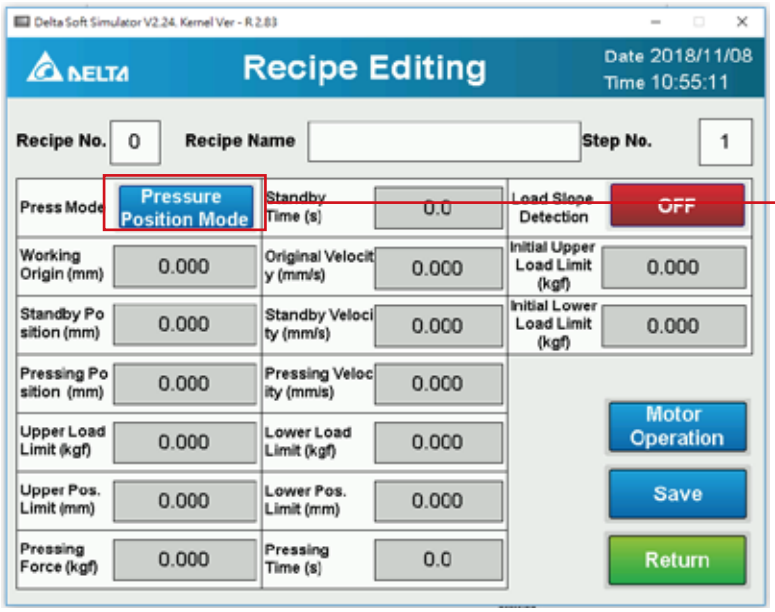
D. Select the recipe step to be modified, and then click [Modify] to enter the modification page

Select the movement step to modify. The selected row will turn blue with white letters. Confirm and click [Modify]. Enter the modification page



Displays the recipe step number

E. Select a movement mode for the step:

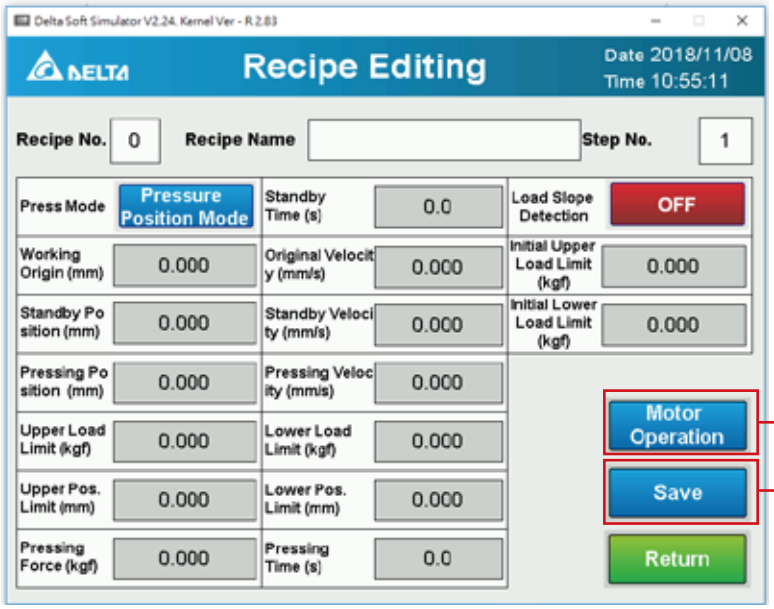


點擊選擇動作模式

[Motionless], [Position Mode], [Load Mode], [Distance Mode], [Load & Position Mode], [Load & Distance Mode]

Choose from five modes.
Select a mode and click [OK]. The page will automatically jump to the setup page and display the values to be entered for that mode.
Click [Cancel] to remove selection and return to the setup page.

F. Recipe step editing



Click to display the simple motor operation page, through which the punch may be moved up and down and load may be monitored, as below figure

Click Save when all values are entered. The screen will automatically jump back to the movement recipe overview page, as figure in step G.

Simple motor operation page.

G. If addition of a subsequent step is required, select the next step and add it as per step d.

H. When all steps are confirmed, click on  to return to home or change the recipe number to continue editing.

Note: When the first and third steps have corresponding movement modes entered but the second step does not, the recipe will stop movement once the first step ends.

8. Error alarm report

8. Error alarm report

8-1. Machine alarm handling

Alarm code	Alarm message	Handling method
003	Z-axis motor error alarm	Click Retry to see if the alarm can be cleared. If it cannot be cleared, check the drive alarm message and consult the below chart on how to handle.
004	EMO (emergency off) is pressed down	Check if the emergency stop button is pressed down. Turn clockwise to release EMO and retry.
005	Uninitialized _ EMO (emergency off) is pressed down	
121	Load cell sensor module voltage error	Check if the 211LC module power source is disconnected.
122	Load cell sensor module hardware error	Change 211LC module.
123	Load cell sensor module CH1 input exceeds measurement range, or SEN voltage error	Check if the load cell sensor wires are loose.
124	Load cell sensor module CH1 calibration error	Recalibrate load cell sensor.
125	Load cell sensor module CH1 exceeds maximum load	Check if the load has exceeded the machine's upper load sensing limit

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