## CONTINUATION

Data of the manual is described equally upon the latest product, because of improvement or other change, description of manual may differ from practical situationslightly. Our company will reserve the right of correcting at any moment, it is difficult to notify the corrected place one by one.



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SUNDOO®
ADVANCED PRECISION INSTRUMENT

# SDS SERIES USER'S MANUAL

## SDS Series User Manual

## 全自动弹簧试验机
## FULL-AUTOMATIC SPRING TESTER

温州山度仪器有限公司
WENZHOU SUNDOO INSTRUMENTS CO., LTD

2.Button instruction

The micro printer is with SEL、LF and cover button.

Bright SEL light means printer online and is receiving the data; Grey SEL light means printer off and is dealing with the data.

SEL button is used for changing between the two status.

During printing,pressing SEL button make the printer stop printing, then install paper, pressing SEL button again continue to print.

3.Roll paper installation

1). Open the front cover by pressing cover button.

2) .Put roll paper in the printer box and pull-out a section.

3) .Close front cover.

4). Make printer off-line by pressing SEL button ( SEL light is off), then rotate handpiece by pressing LF button ( you should notice whether the paper is crooked), make the printer online by pressing SEL button again.

## Packing List

| Item | Name | Quantity |
|---|---|---|
| 1 | Spring Tester Body | 1 |
| 2 | Power Line | 1 |
| 3 | Resistamle Pen | 1 |
| 4 | Manual | 1 |
| 5 | Factory Report | 1 |
| 6 | Qualification Certificate | 1 |



Thank you very much for your purchase of SDS full-automatic spring tester.

This spring tester adopts advanced electric technology and high-efficiency mechanical drive. Compared to traditional spring tester, higher accuracy, better stability.Various test mode inside, simpler and more efficient for operation.The drive mechanism adopts servo system and ball screw for high-efficiency drive and accurate positioning. High accuracy sensor for test precision and stability.High resolution colorful touch screen for convenience and intuition. Before using the instrument,please read the manual carefully for accurate data and effective protection.

# Contents







requirement),test speed is 10.0mm/min, constant force value is 0010.00N The setting of multipoint change is the following.

| | |
|---|---|
| 0、001.000 | 5、000.000 |
| 1、002.000 | 6、000.000 |
| 2、003.000 | 7、000.000 |
| 3、004.000 | 8、000.000 |
| 4、005.000 | 9、000.000 |

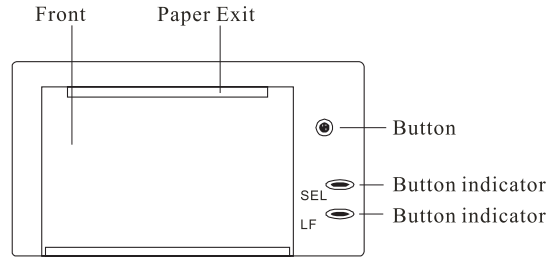
③Then escape.
④Start to test, and it will finish test automatically.
⑤Under curve interface,press the “report”button for viewing the test data.

9.Example: test the force of every change 1mm when the prepressing is 100mm, total change 5 mm, test speed is 10mm/min.
① Put spring on platen.
② Enter interface of parameters setting by pressing “SET” button, test direction is compression, test mode is “constant displacement multipoint test ”, No-load speed is 100.0mm/min ( change the speed according to actual requirement),test speed is 10.0mm/min, constant displacement value is 100.000mm, the setting of multipoint change is the following:

| | |
|---|---|
| 0、001.000 | 5、000.000 |
| 1、002.000 | 6、000.000 |
| 2、003.000 | 7、000.000 |
| 3、004.000 | 8、000.000 |
| 4、005.000 | 9、000.000 |

③Then escape.
④Start to test, and it will finish test automatically.
①Under curve interface,press the “report”button for viewing the test data.

D.Micro printer
1.Panel



5.Example: Test the height when spring force is 10N? test speed is 10mm/min, cycle times is 50.
①Put spring on platen.
②Enter interface of parameters setting by pressing "SET" button, test direction is compression, test mode is "constant force fatigue", no-load speed is 100.0mm/min (change the speed according to actual requirement), test speed is 10.0mm/min, constant force value is 10N, cycle times is 50, then escape.
③Start to test, and it will finish test automatically.
④Press "report" button under curve interface to view data details.

6.Example: Test the force when spring heiqht is 10mm ? speed is 10mm/min, cycle times is 50.
①Put spring on platen.
②Enter interface of parameters setting by pressing "SET" button, test direction is compression, test mode is "constant displacement fatigue", no-load speed is 100.0mm/min ( change the speed according to actual requirement),test speed is 10.0mm/min, constant displacement value is 010.000mm,cycle times is 50, then escape.
③Start to test, and it will finish test automatically.
④Press "report" button under curve interface to view data details.

7.Example: Test the force when spring height is 10mm ? test speed is 10mm/min, cycle times is 50.
①Put spring on platen.
②Enter interface of parameters setting by pressing "SET" button, test direction is compression, test mode is "fatigue test of constant displacement ", no-load speed is 100.0mm/min ( change the speed according to actual requirement),test speed is 10.0mm/min, constant displacement value is 010.000mm,cycle times is 50, then escape.
③Start to test, and it will finish test automatically.
④Under curve interface,press the "report"button for viewing the test data.

8.Example: test the force of every change 1mm when the prepressing is 10N, total change 5 mm, test speed is 10mm/min.
①Put spring on platen.
②Enter interface of parameters setting by pressing "SET" button, test direction is compression, test mode is "constant force multipoint test", no-load speed is 100.0mm/min ( change the speed according to actual





## Specification

| Model | SDS-10 | SDS-100 | SDS-500 | SDS-1000 |
|---|---|---|---|---|
| Capacity | 10N | 100N | 500N | 1000N |
| Resolution | 0.001N | 0.01N | 0.05N | 0.1N |
| Test range | 1%～100%FS | | | |
| Force accuracy | ±1%(Test range＜10%FS) , ±0.5%(Test range＞10%FS) | | | |
| Test speed | 0.5～500mm/min | | | |
| Speed accuracy | ±2%(Speed＜10%FS) , ±1%(Speed≥10%FS) | | | |
| Unit | N、kgf、lbf、ozf | | | |
| Displacement resolution | 0.001mm | | | |
| Displacement stroke | 170mm | | | |
| Max. free length | 170mm | | | |
| Power | AC 220V±10% 50/60HZ | | | |

## Function

SDS full-automatic spring tester adopts advanced electric technology and high-efficiency mechanical drive. High accuracy sensor for test precision and stability, It is mainly used to test compression/tension, fatigue, stiffness for springs/rubber/ shrapnel/other elasticity objects.

## Characteristics

1. 800×480 pixel TFT colorful screen with touch functions, peak/real-time value/force curve display at the same time.
2. Different test mode for different test requirements: manual mode, constant force mode, constant displacement mode, constant deformation mode, constant force fatigue test mode, constant displacement fatigue test mode, constant force multipoint test mode, constant displacement multipoint test mode.
3. Save 10 test value and 3 groups test curve, print test report through printer inside.
4. Four units option: N/kgf/lbf/ozf, automatic exchange.
5. Automatic zero calibration for displacement.
6. Automatically back to starting location after finishing test.
7. Two speed mode, high speed approach and low speed collect.
8. Mechanical limit, auto-stop for overload, scraming function.
9. High precision ball screw, better drive efficiency and high accurate displacement.
10. Servo drive system, low noise and good stabilization.
11. High accuracy sensor, promise test precision.
12. Automatic shutdown mode without any operation, time is set freely.

## Work environment

1. Work temperature: 20 ℃ ±10℃.
2. Relative humidity:35%RH-65%RH.
3. No shock and corrosive material around.

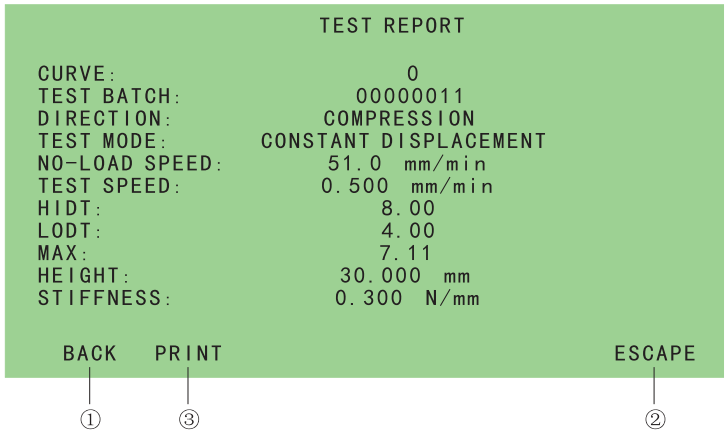




C. Operation sample

1. Preparation before testing
   ①Enter interface of parameters setting by pressing "SET" button, choose "ZERO Calibration" as test mode, then escape.
   ②Adjust the platen space 10mm by six buttons"▲H""▲M""▲L""▼H""▼M""▼L".
   ③Start to zero calibration by pressing " START " button.
   ④After finishing zero calibration(displacement invariant) ,adjust sensor house for testing by six buttons"▲H""▲M""▲L""▼H""▼M""▼L".
2. Example: Test the height when spring force is 10N ? speed is 10mm/min.
   ① Put spring on platen.
   ② Enter interface of parameters setting by pressing "SET" button, test direction is compression, test mode is " constant force", no-load speed is 100.0mm/min (change the speed according to actual requirement), test speed is 10.0mm/min, constant force value is 0010.00N, then escape.
   ③Start to test, and it will finish test automatically.
   ④Finally, it will display the height on screen against the force 10N.
3. Example:Test the force when spring height is 10mm ? test speed is 10mm/min.
   ①Put spring on platen.
   ②Enter interface of parameters setting by pressing "SET" button, test direction is compression, test mode is " constant displacement", no-load speed is 100.0mm/min ( change the speed according to actual requirement),test speed is 10.0mm/min, constant displacement value is 010.000mm, then escape.
   ③Start to test, and it will finish test automatically.
   ④Finally, it will display the force on screen against the height 10mm.
4. Example: Test the force when spring deformation is 10mm ? speed is 10 mm/min.
   ①Put spring on platen.
   ②Enter interface of parameters setting by pressing "SET" button, test direction is compression, test mode is "constant deformation", no-load speed is 100.0mm/min ( change the speed according to actual requirement), test speed is 10.0mm/min, constant deformation is 0010.00mm,then escape.
   ③Start to test, and it will finish test automatically.
   ④Finally it will display the force against the deformation 10mm.

8.Interface of test report



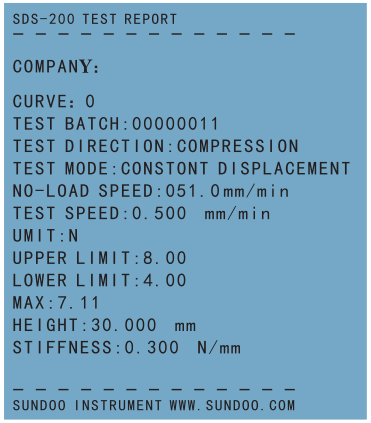

①Back:

"ZERO" of curve place means finished curve data, and return to interface of curve storage by pressing the button.

If the curve place is one/two/three, return to interface of view by pressing the button.

②Escape: return to work interface of initialization by pressing the button.

③Print: Print all storage data by pressing the button(sample below)








**⚠ CAUTION** Wrong operation may damage this equipment or even cause serious accident. There are important precautions and operation methods listed in our manual, so please read it before using the equipment. If shock load is tested, please choose spring tester which the capacity is double of the load.

**⚠ WARNING**

1.Please wear protective mask and gloves to protect you from scattering pieces during fracture test.

2.Do not use damaged or warped clamps to avoid them off or breaking down to cause hurt.

3.This equipment is used for testing compression and tension of springs. Do not force on the direction of sensor and bending.

4.Do not use the equipment with overload. The equipment has overload protection, and no protection against shock load.

5.When the force show red, it means that the sensor exceeds the capacity and you should stopping operate.

## Attention and maintenance

1.Using the instrument with overload will damage, even cause danger.

2.Do not hit the screen or put anything on it.

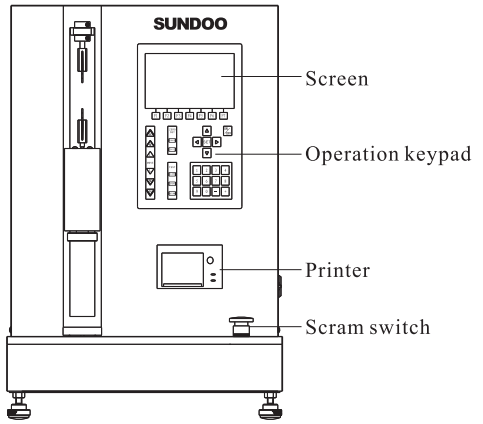
3.Do not use nails and pointed tools to press the buttons.

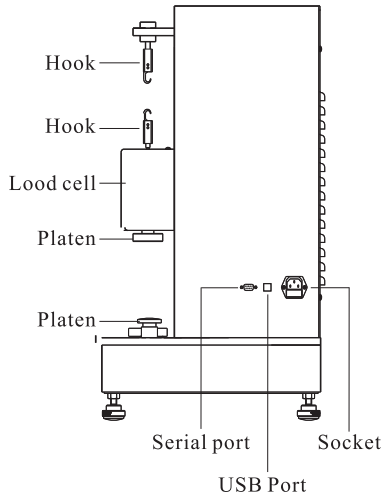
4.Do not operate the equipment near water,oil or other liquids. Please put the equipment in dry ,cool and stable place.

5.Do not plug adaptor with net hand to against electrical shock.

6.Clean this tester with soft cloth.Firstly put cloth in the water of cleanser, then dry cloth and clean the tester. Do not use volatile chemical liquid, such as volatile oil,thinner,alcohol, etc.

## Part names and functions



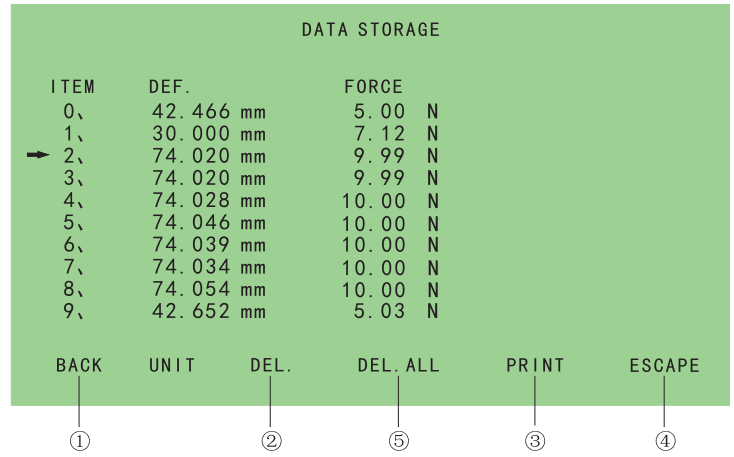


| Part | Function |
|---|---|
| USB port | Connect to computer with special software. |
| Serial port | Communicate to computer. |
| Socket | Input: AC 220V±10%, 50/60HZ ( earth needed). |
| Scram switch | Stop the instrument in case of emergency. |
| Printer | Print storage data and test report. |
| Hook | Test tension ( small hook is for the force 0%-10%FS; big hook is for the force 10%-100%FS). |
| Platen | Test compression. |

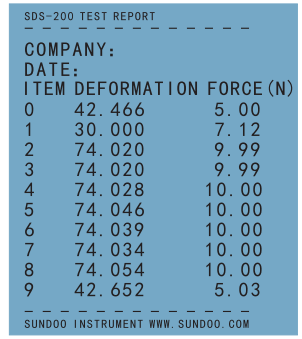




7.Interface of data view

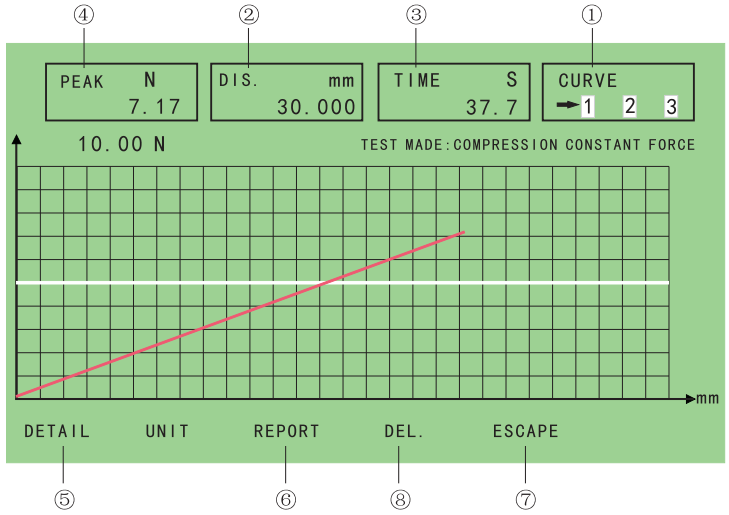



①Back: Return to interface of view by pressing the button.
②Del.: Delete storage data which "→" point by pressing the button.
③Print :Print all storage data by pressing the button ( sample below).




④Escape: Return to work interface of initialization by pressing the button.
⑤Del. all: Delete all storage data by pressing the button.

6.Interface of view

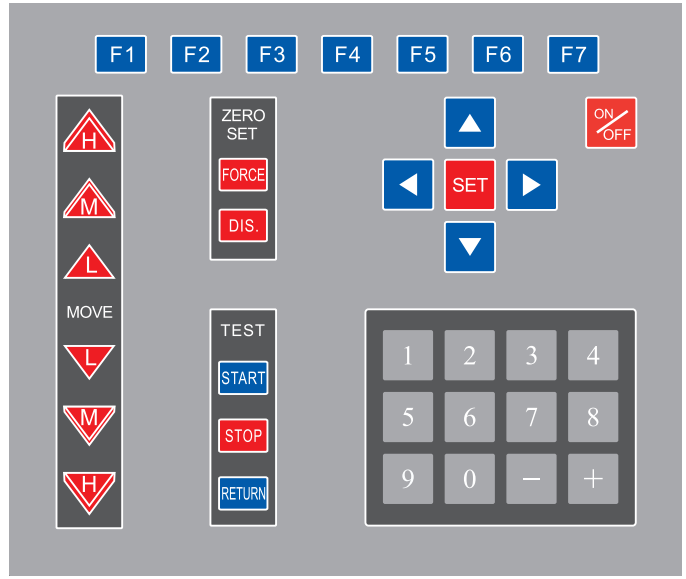



①Curve:
White typeface means stored curve.
Other color means no curve.
"→" point to current curve place.
②Dis.: Total displacement of current storage curve.
③Time:Total time of current storage curve.
④Peak: Max. value of current storage curve.
⑤Detail: Enter interface of curve details by pressing the button.
⑥Report: enter interface of test report by pressing the button.
⑦Escape: Return to work interface of initialization by pressing the button.
⑧Del.: Delete the curve by pressing the button.





## Operation keypad




## Introduction of product functions

A.Quick start guide

ON/OFF Power switch.

SET Under work interface of initialization,used for setting parameter.

▲ Under work interface of initialization, used for choosing storage place of current data.
Under interface of parameters setting,used for moving cursor.
Under interface of data viewing, used for choosing data storage place.
Under interface of curve storage, used for choosing data storage place.
Under interface of curve details, used for viewing last curve.

▼ Under work interface of initialization, used for choosing storage place of current data.
Under interface of parameters setting, used for moving cursor.
Under interface of data viewing, used for choosing data storage place.
Under interface of curve storage, used for choosing data storage place.
Under interface of curve details, used for viewing next curve.

◄ Under interface of parameters setting, used for moving cursor.
Under interface of data viewing, used for choosing storage curve.
Under interface of curve storage, used for choosing curve storage place.
Under interface of curve details, used for viewing every point on curve.
During curve saving, used for choosing number of test batch.

► Under interface of parameters setting, used for moving cursor.
Under interface of data viewing, used for choosing storage curve.
Under interface of curve storage, used for choosing curve storage place.
Under interface of curve details, used for viewing every point on curve.
During curve saving, used for choosing number of test batch.

H Under work interface of initialization, move up with 500mm/min by pressing the button.

M Under work interface of initialization, move up with 50mm/min by pressing the button.

L Under work interface of initialization, move up with 5mm/min by pressing the button.

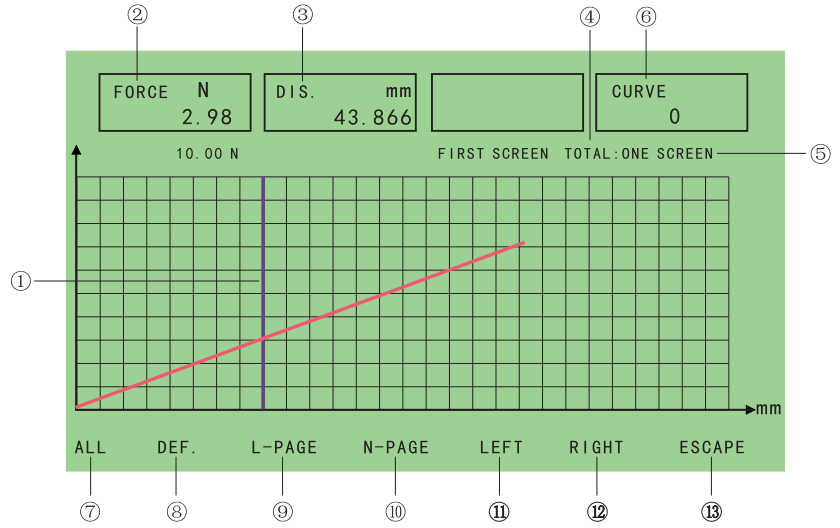
L Under work interface of initialization, move down with 5mm/min by pressing the button.

M Under work interface of initialization, move down with 50mm/min by pressing the button.



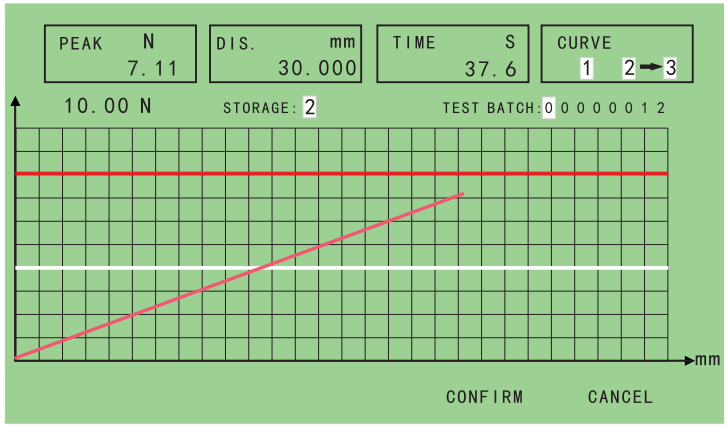


5.Interface of curve details




①Cursor: point to current curve view point, pressing"◄" "►" once move a grid, Pressing "◄" or "►" all the time move the cursor quickly.
②Force: current force on curve.
③Displacement: current displacement on curve.
④Current screen position.
⑤Total data on curve.
⑥Curve place: current curve storage place.
⑦All buttons:
If curve place is 0, press the button and return to interface of curve storage.
If curve place is 1、2、3, press the button and return to interface of view.
⑧Deformation: displacement data change to deformation data by pressing the button.
⑨Last screen: curve return to last screen by pressing the button.
⑩Next screen: curve return to next screen by pressing the button.
⑪Left shift: cursor move a grid by pressing the button.
⑫Right shift: cursor move a grid by pressing the button.
⑬Escape: return to work interface of initialization.

⑧C-save: pressing the button will appear the following interface:




(Note:adjust cursor by "▲" "▼" "◄" "►" buttons, and modify test batch, then save curve to corresponding place which the" → "point by pressing confirm button and cancel save operation by pressing cancel button, return to interface of curve storage.)

⑨D-save: save peak and displacement data to corresponding storage place by pressing the button.

⑩Report: view test report by pressing the button and enter interface of report viewing.

⑪Escape: return to work interface of initialization by pressing the button.

⑫Unit: automatic exchange of N/kgf/lbf/ozf by pressing the button.

⑬Detail: Enter interface of curve details and view every point value by pressing the button.





▽H Under work interface of initialization, move down with 500mm/min by pressing the button.

FORCE Under work interface of initialization,zero current force.

DIS. Under work interface of initialization,zero current displacement.

START Under work interface of initialization, start to test by pressing the button.

STOP Under work interface of initialization, stop testing by pressing the button.

RETURN Under work interface of initialization,return to initial position by pressing the button

＋ Under interface of parameters setting ,used for changing parameter, During curve saving, used for changing number of test batch.

－ Under interface of parameters setting ,used for changing parameter, During curve saving, used for changing number of test batch.

Number buttons:

Under interface of parameters setting ,used for changing parameter, During curve saving, used for changing number of test batch.

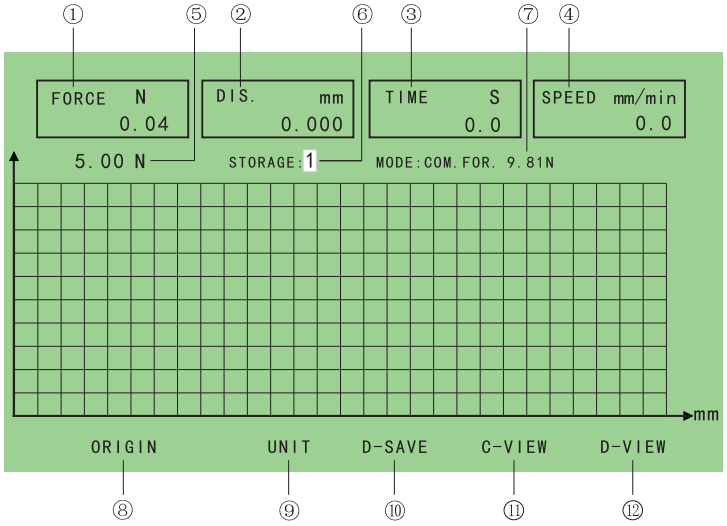
Function buttons:

F1/F2/F3/F4/F5/F6/F7/function depend on the instruction of screen.

B.Functions details

1. Work interface of initialization

On:press"⏻"button for power on. The tester enter self-inspection and show SUNDOO and model on screen, then enter work interface of initialization. (picture below)




①Force: current force value

Touch force could reach to the interface of parameter settings for constant force mode.

②Dis.: current displacement value

Touch displacement could reach to the interface of parameter settings for constant displacement mode.

③Time: measurement time

④Speed: current speed

Touch speed could reach to the interface of parameter settings for no-load speed and test speed.

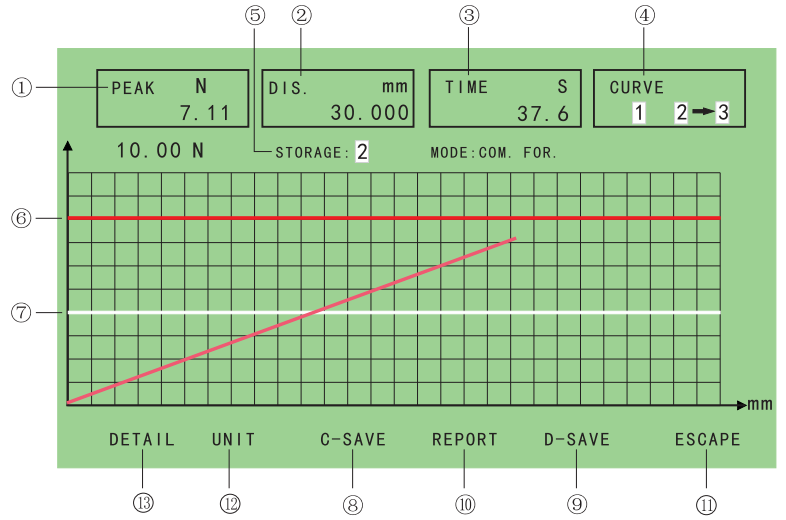
⑤Step value: when the tester start to draw, if test value exceeds step value, it will switch to next step.

⑥Storage: show current storage place, if the number color is white, it means that the place already has data.





4.Interface of curve storage




①Peak: max.value.

②Dis.: the displacement after finishing test.

③Time: total test time.

④Curve: save curve to corresponding place.

⑤Storage: save peak and displacement data.

⑥Upper limit line(red): If upper limit value exceed step value, the upper limit line does not display.

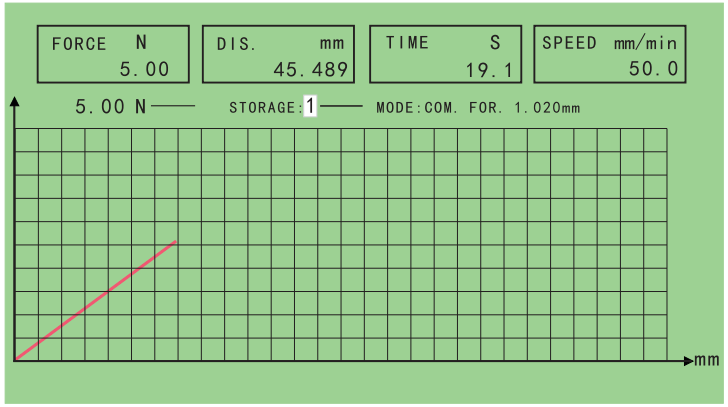
⑦Lower limit line(yellow): If lower limit value exceed step value, the lower limit line does not display.

①Displacement setting: When reach to pre-set displacement,then calculate spring deflection.

(Note: move cursor to relevant options by pressing“▲”“▼”“◄”“►”, then modify the parameters by pressing“+”“−”buttons or number buttons, hen pressing escape button to save the parameters and return to the work interface of initialization.)

3.Test interface

Under work interface of initialization, pressing “START” button make the instrument enter test interface according to select mode. ( picture below)




(Note: Under test interface, pressing “STOP”button make the instrument stop testing amd enter curve storage interface)





⑦Mode: show current test mode.Touching could reach to the interface of parameter settings.Red typeface means power off wrongly and lead to wrong displacement. Displacement calibration is needed.

⑧Origin: when test direction is compression,it show compression and is used for reset of compression origin; when test direction is tension, it show tension and is used for reset of tension origin.

⑨Unit: Four units (N/kgf/lbf/ozf ),automatic exchange by pressing the button.

⑩D-save: save current data to storage place.

⑪C-view: enter view interface by pressing the button.

⑫D-view: enter data viewing interface by pressing the button.

2. Interface of parameters setting

Under work interface of initialization, pressing“SET”button enter interface of parameters setting for choosing test mode.

Test mode:

Manual mode, constant force mode, constant displacement mode, constant deformation mode, constant force fatigue test mode, constant displacement fatigue test mode, constant force multipoint test mode, constant displacement multipoint test mode, zero calibration

Manual mode: manual operation and adjust the height needed by the six buttons“▲H”“▲M”“▲L”“▼H”“▼M”“▼L”.Finally finish testing.by pressing “STOP”.

Constant force mode: automatic operation, test spring force under pre-set work height.

Constant force mode: automatic operation, test work height under pre-set force.

Constant displacement mode: automatic operation, test spring force under pre-set work height

Constant deformation mode: automatic operation, test spring force under pre-set deformation.

Constant force fatigue test mode: automatic operation, repeatedly test spring work height under pre-set force and record former 10 groups data.

Constant displacement fatigue test mode: automatic operation, repeatedly test spring force under pre-set work height and record former

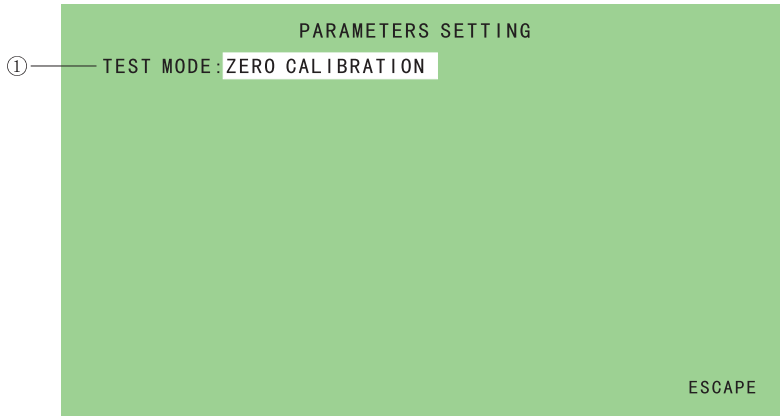
10 groups data.

Constant force multipoint test mode: automatic operation, record the data of every spring deformation and force variation from pre-set force on.

Constant displacement multipoint test mode: automatic operation, record the data of every spring deformation and force variation from pre-set work height on.

Zero adjustment: adjust displacement zero.

1).Test mode of zero calibration (picture below)




Test mode: nine test modes option

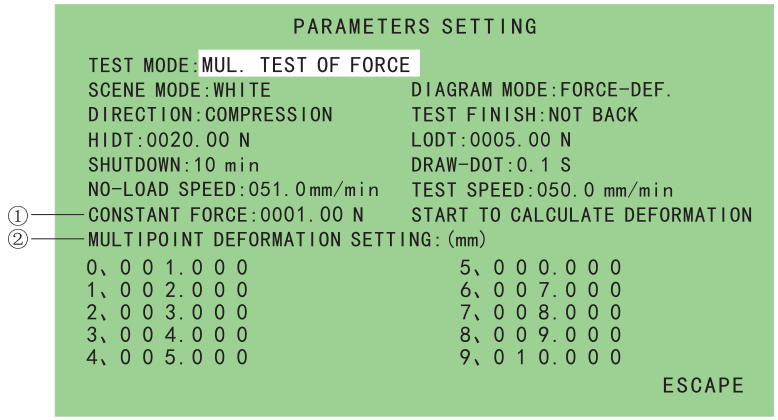
Manual mode, constant force mode, constant displacement mode, constant deformation mode, constant force fatigue test mode, constant displacement fatigue test mode, constant force multipoint test mode, constant displacement multipoint test mode.

Zero calibration: adjust displacement zero.





8).Constant force multipoint test mode (picture below)

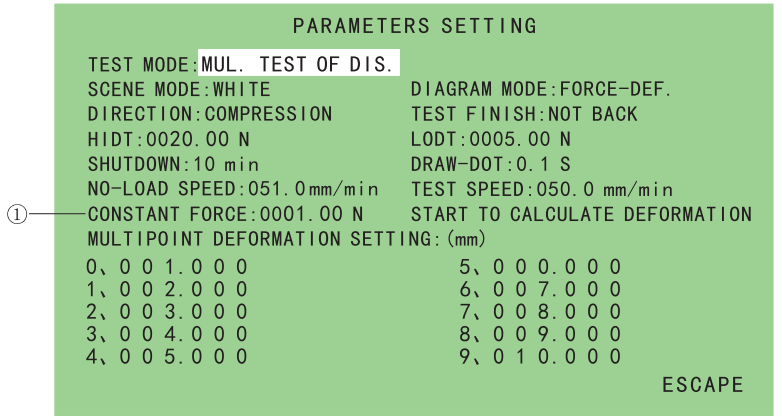



①Force setting: after reaching to the pre-set force,calculate spring deflection.

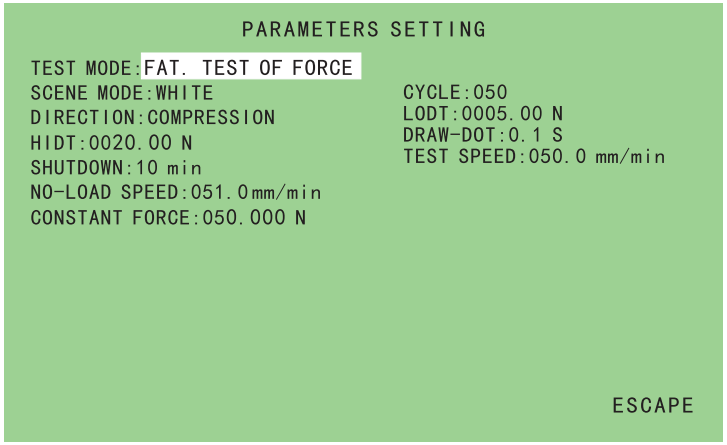
②Multipoint deformation length setting:

From the zero point to the ninth point,if any point data exceed next point data,stop testing.For example,if the third point data is 3. 000mm, the fourth point data is 0. 008mm,it only test the third point data,and don't continue to test.

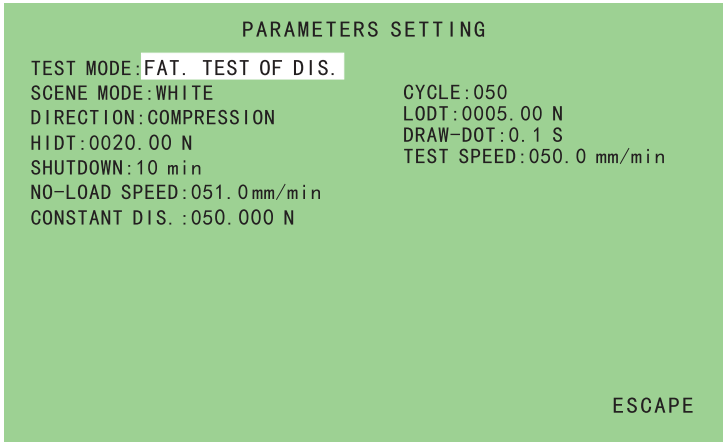
9).Constant displacement multipoint test mode(picture below)



6).Constant force fatigue test mode (picture below)



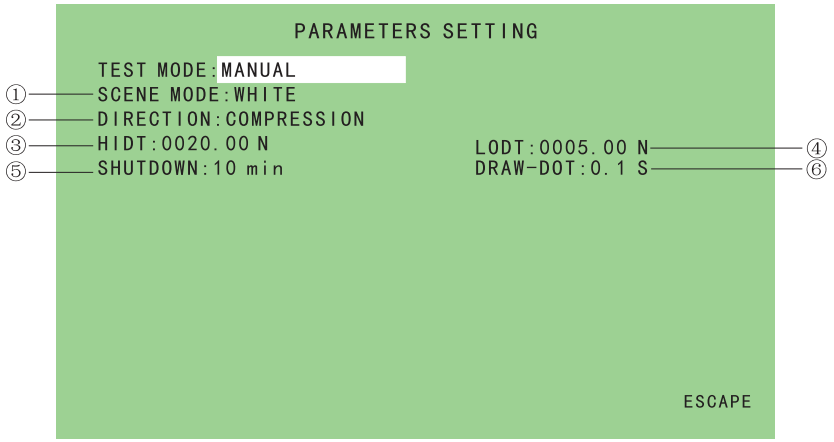

7).Constant displacement fatigue test mode (picture below)








2).Manual test mode(picture below)




①Scene mode: change among different background modes
White-green: white typeface, green background.
White-blue: white typeface, blue background.
White-grey: white typeface, grey background.

②Test direction: choose direction from compression and tension.

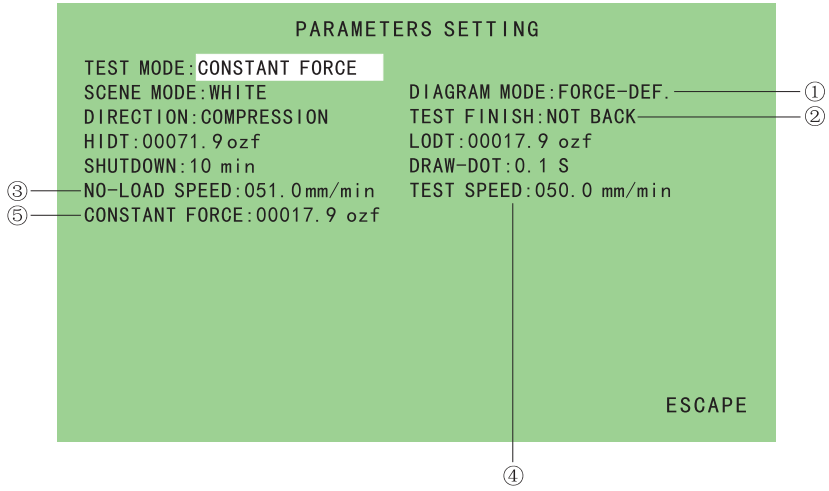
③Upper limit value; set upper limit value.

④Lower limit value:set lower limit value.

⑤Shutdown time setting（0-99 minutes）.

⑥Draw-dot time: 0.1~0.9 second setting.

3).Constant force test mode (picture below)

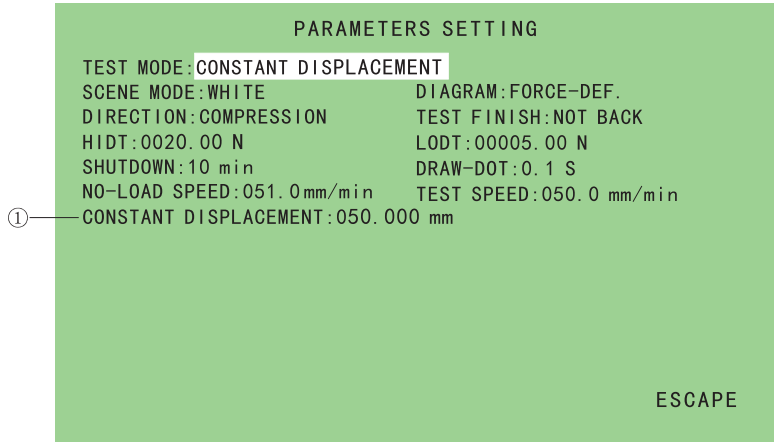



①Diagram mode: abscissa data setting of display curve
Force-time: ordinate is force,abscissa is time.
Force- deformation: ordinate is force,abscissa is deformation.
②Test finish: whether return after finishing test
Back: after finishing test, return to work interface of initialization, sensor house return to original location automatically.
Not Back: after finishing test, return to work interface of initialization, sensor house remain unchanged.
③No-load speed: speed without load.
④Test speed: speed of test.
⑤Force setting: stop moving after reaching to pre-set force.



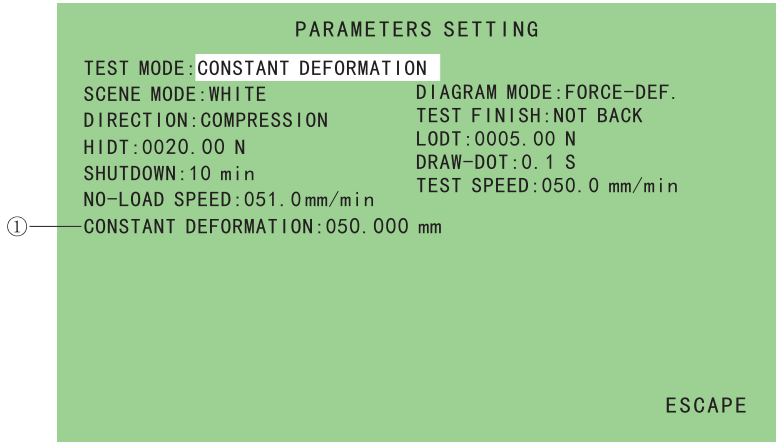


4).Constant displacement test mode(picture below)




①Displacement setting:stop moving after reaching to pre-set displacement.

5).Constant deformation mode（Picture below）




①Constant deformation: the spring tester will stop once it reach to pre-set deformation.