Intelligent Pendulum Hardness Tester
BEVS 1306
User Manual

Please read the user manual before operation.

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Content

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1. Company Profile

BEVS Industrial Co., Ltd. is a leading developer & manufacturer that specializes in coatings, ink, painting, resin testing instruments and laboratory whole solution.

We offer the complete and unique products in this field to meet customer's challenging demands of today and tomorrow, the products are complied with the standards of ISO, ASTM, DIN, BS, EN etc.

With strong supports and hard work by lots of end-users and worldwide agents, BEVS become more and more famous in the world and provides more competitive values for our customers.

2. Product Introduction

BEVS 1306 Intelligent Pendulum Hardness Tester is a fully automatic, touch-screen controlled instument for the measurement of flat test panels for coatings, paints, etc. The Persoz pendulum or Konig pendulum used in this product is measured according to the standard ASTM D 4366, BS 3900 E5, DIN 53157, ISO 1522, NF T30-016, GB / T1730. The test principle is as follows: The pendulum rod is placed on the test surface of the test panel. The two steel pendulums of the pendulum are in contact with the test surface. The pendulum motion is performed. The test surface with different hardness reflects different swing times, and the harder the coating is, the more the damping is.

Features：

* The test process is fully automated. The organic glass cover is automatically raised up and down. The test panel platform automatically lifts and hangs the swing bar. The shift lever mechanism automatically sets the swing bar to the corresponding angle and automatically releases the swing bar for testing.

* Automatically identify the pendulum type and start counting.

* Digital recognition of level conditions makes sure high precision.

* With temperature and humidity sensors.

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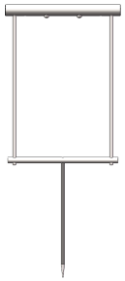
* High-precision guide rail ensures smooth movement and low noise.

* 4.3 inch touch screen and user-friendly interface.

* Data saved, and can be connected to a computer for output.

2.1 Technical Specification

Dimension: L445*W350*H750mm(with cover open: 1270mm)
Mass: 30kg
Test Panel: L(70-200mm)*W(80-100mm)*H(1.5-10mm)
Voltage: 100-230V(50/60HZ)
Power: Max 50W

Type	Persoz	König
/		
Mass	500±0.1g	200±0.2g
Ball Diameter	SØ8mm	SØ5mm
Distance between Ball	50mm	30mm
Deflection Angle	12° ~4°	6° ~3°
Oscillation period	1±0.01s	1.4±0.02s

3. Operation Instruction

3.1 Note

3.1.1 Please keep the package for future use if possible.
3.1.2 Please read this manual before operation and keep it
3.1.3 Do not open the instrument housing or motion mechanism housing.

3.2 Safety Instruction

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3.2.1 Please read all warnings on the instrument.
3.2.2 Ensure the voltage right.
3.2.3 Do not tear down the instrument on you own.
3.2.4 Organic glass cover can't be move manually.
3.2.5 Be careful while taking the pendulum, it is sharp. Keep it good and get a new one while damaged.
3.2.6 Ensure cover inside clear to operate.

3.3 Operation Environment

Ensure the instrument at a proper environment, temp.: 10℃～35℃, humidity 15～85%, no condensation, wind speed: 0-0.2m/s.

3.4 Placement

Ensure the instrument at a horizontal level and enough space for the operator. Calibrate the level every time while moving the instrument.

3.5 Power Supply

Ensure earth line connected, input voltage: 100~230V, 50~60HZ

3.6 Operation Steps

3.6.1 Product Structure

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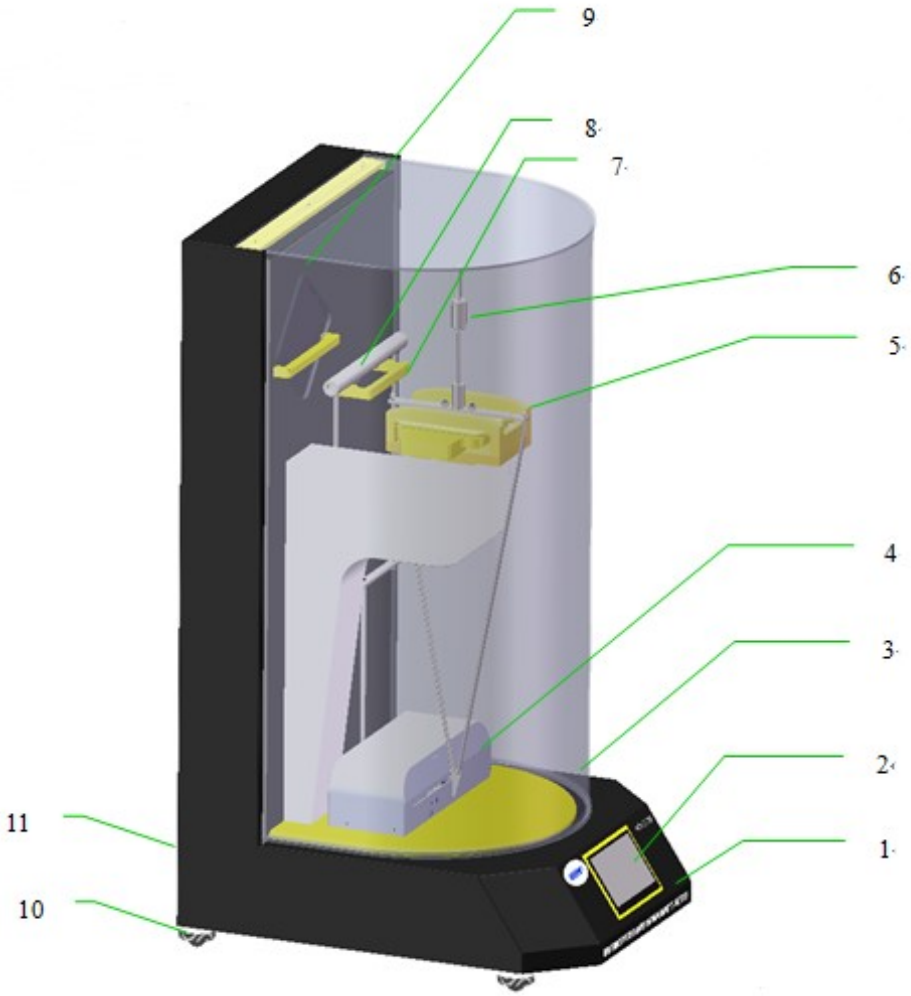

Figure 1

1	Shell	6	KONIG Pendulum
2	Touch Screen	7	Hanging seat for pendulum
3	Organic glass cover	8	PERSOZ Pendulum
4	Device of offsetting pendulum angle and releasing	9	Hanging seat for standard glass
5	Device of lifting the pendulum	10	Adjustable footpad
11	Power input		

3.6.2 Explanation

Under normal circumstances, König pendulum's result time is close to half of the PERSOZ pendulum's. From this point of view, the PERSOZ pendulum is considered to have a better resolution than the König pendulum; however, the PERSOZ pendulum slips on hard coatings due to its lower center of gravity. It will affect the actual measurement accuracy to some extent. It is generally believed that the König pendulum is more suitable for the

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determination of hard coatings, and the PERSOZ pendulum is more suitable for the determination of soft coatings. Due to the differences in structure, weight, size, oscillation period and swing between the two pendulums, and the complex elastic and viscous changes under the interaction between the pendulum and the coating, the two pendulums do not have equivalent conversion relationship of measurement results.

3.6.3 Steps

1) Power on

Place the instrument properly according to 3.2-3.5 and turn the switch on.

2) Main Interface

After booting, the instrument enters the main interface as shown below. Click “Settings” to set and adjust the related parameters, “up” and “down” button controls the cover. Press the start button, the instrument will automatically determine if the test conditions have been reached or not. (Like with cover closed or not). The instrument warns when not reaching the operation conditions. The stop button can stop all the current operations at any time.

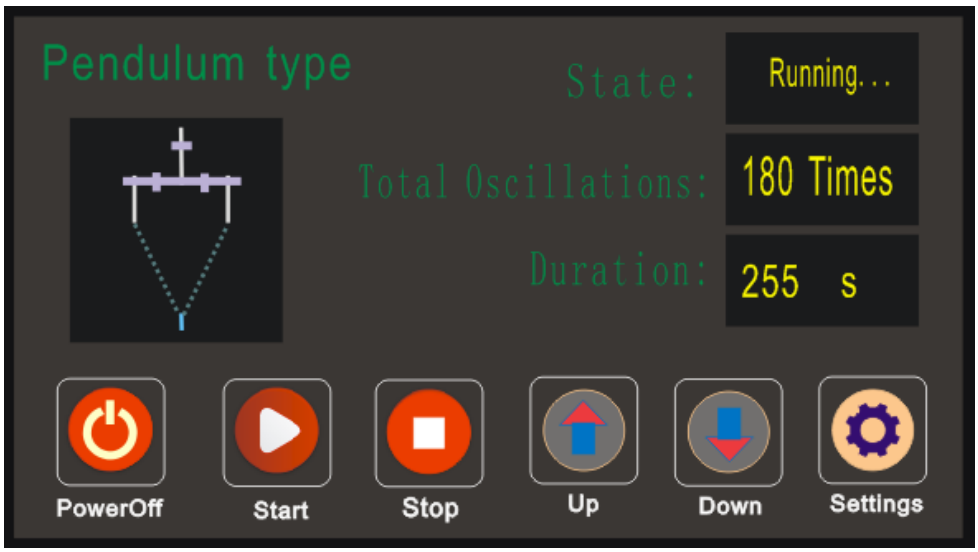

Figure 2

3) Open Cover

Click “Up” button to open it.

4) Place test panel and pendulum

There are two holes on both sides of the steel balls of the two pendulums. When placing the PERSOZ pendulum, ensure the holes mount onto the pins on the hanging shelf as shown below (KONIG pendulum, the same way to hang). Place the test panel on the test platform from right to left.

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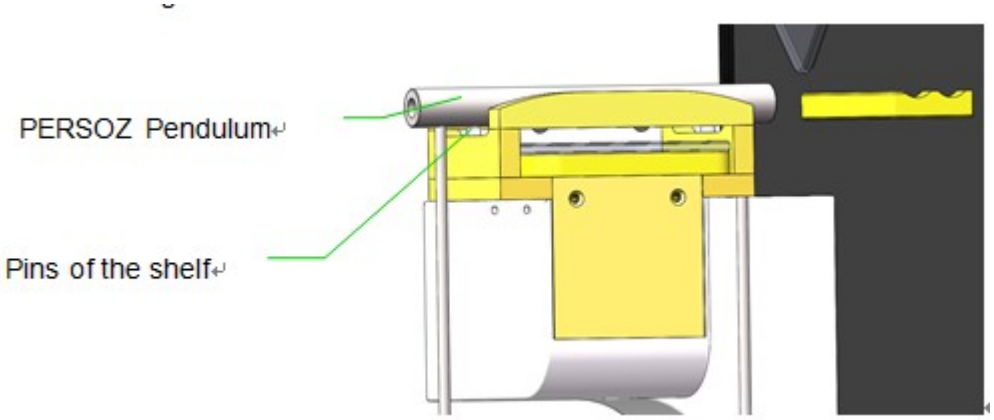

Figure 3

5) Level adjustment

Note: It is not necessary to adjust the level every time, instrument can be self-tested whether it is in the horizontal state or not. If there is a warning, please adjust it.

BEVS 1306 adopts high-precision electronic level meter to monitor the horizontal status. It can display the status of deviation from four foots. Adjust the four footpads to control the horizontal status.

Figure 4

Click “Settings” button on the main interface to enter the setup page of level adjustment as pic below. Adjust the footpads to make each value as close to 0 as possible. “0” means that there is no deviation, and it reaches the full level status. The bigger value is, the bigger deviation is.

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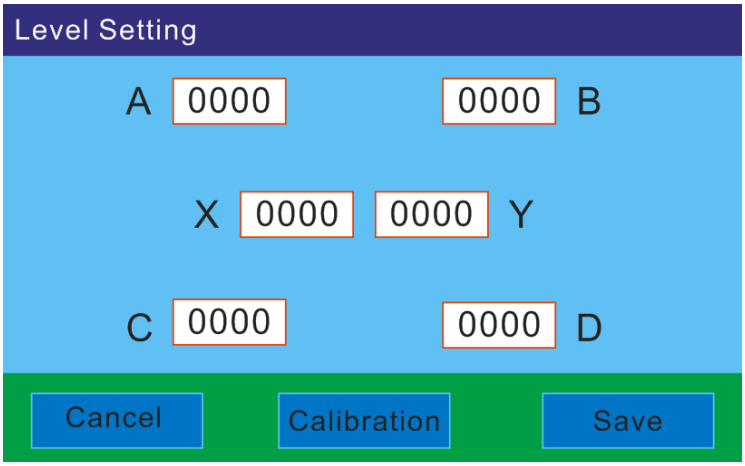

Figure 5

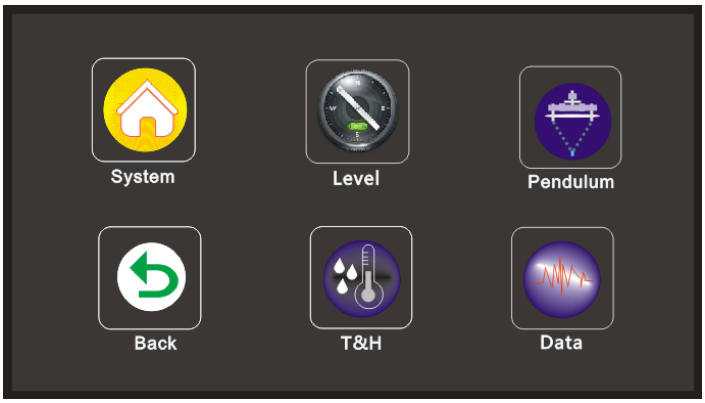

Figure 6

6) Pendulum type setting

Please see below, choose the type you need. It is no need to set it when auto mode on.

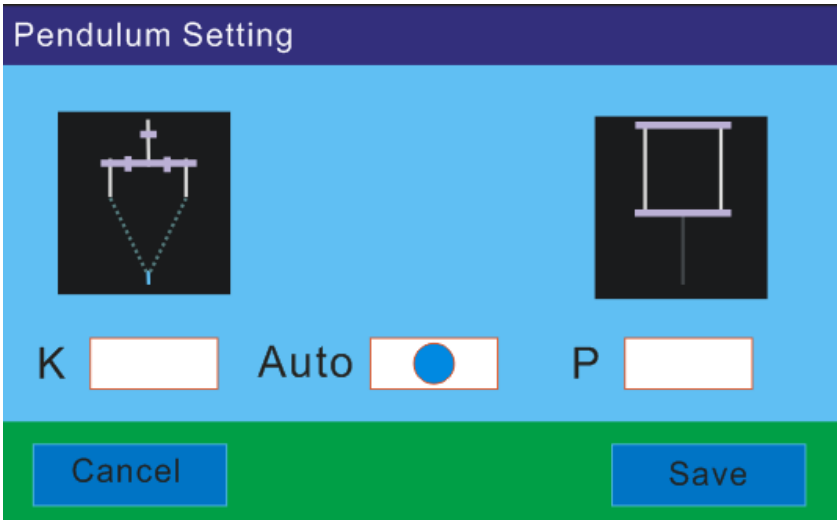

Figure 7

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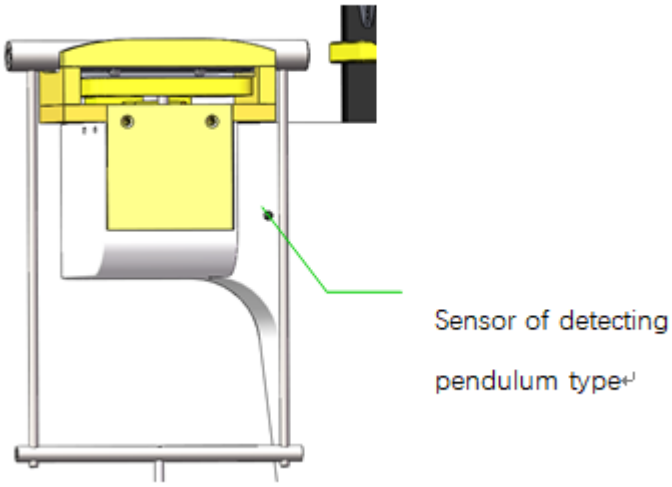

Figure 8

Auto mode will detect the pendulum type automatically. When the pendulum is placed correctly, the system will recognize and do the measurement accordingly.

7) Close the cover by clicking “Down” button.

8) Start measurement

Start measurement (the instrument will check whether the above step has been executed), when the self-test passes, the test panel platform will be lifted, and test panel will hold up the pendulum to a limited height, pendulum separates from pins.

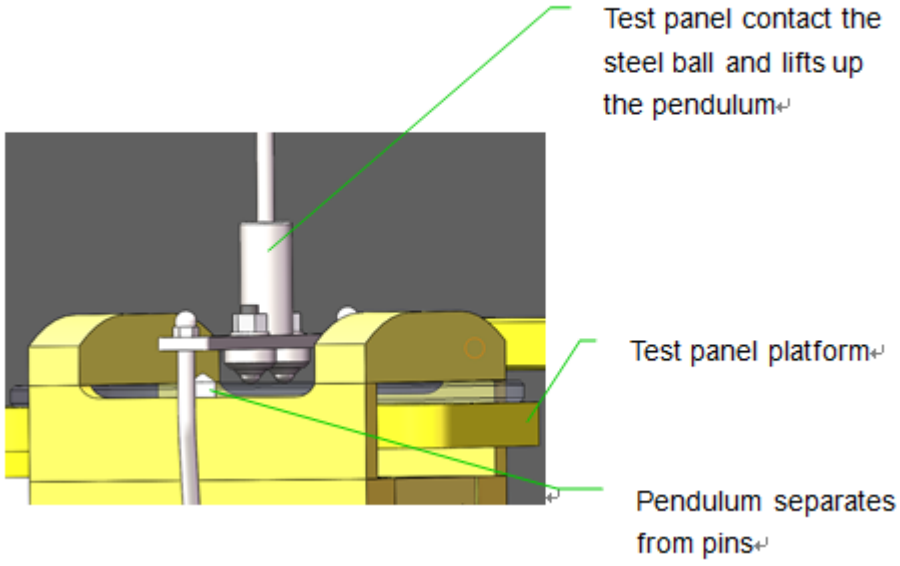

Figure 9

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When the test panel platform rises to a limited height, the waiting time (called the Y axis delay time) can be set up, and the free automatic dialing rod motor is then started to load the corresponding pendulum to a certain angle. Here we can set the waiting time (called the X axis delay time), then release the pendulum to start the swing motion of the pendulum. As shown in Figure 10 (can be set from Figure 6, click system settings and click system data (Figure 16)), this page can set whether to automatically store test data and instrument vibration alerts.

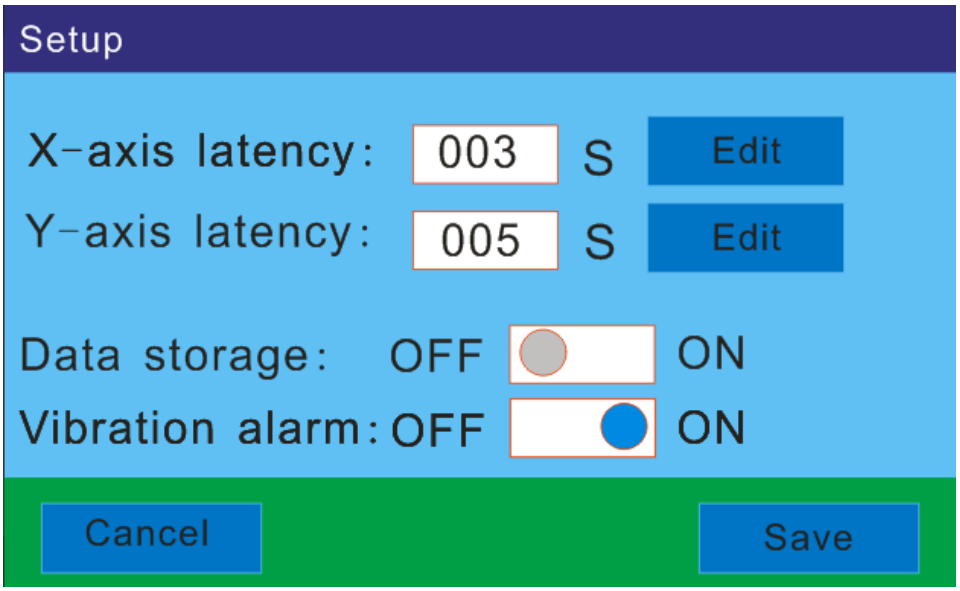
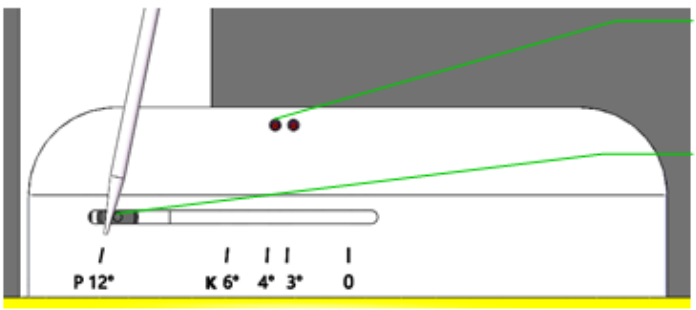


Figure10

When the instrument is tested automatically after the waiting time, the test process of the PERSOZ pendulum is shown as shown in Figure 11. The lever device will dial the swing pointer to 12 degrees, then release the pendulum, the pendulum will swing freely, and the counter and the timer begin to calculate at the same time. The pendulum gradually decays until the amplitude of the pendulum is reduced to 4 degrees, counting and timing are completed, and the measurement results are obtained.



PERSOZ Pendulum Counting Sensor

A removable and retractable element that will swing the lever to the desired angle and release, then pendulum will do the concussion.

Figure 11

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The correct placement of the König pendulum is the same as that of the PERSOZ pendulum. Please refer to the 3.6.3.4 instructions. The effect is shown in Figure 12.

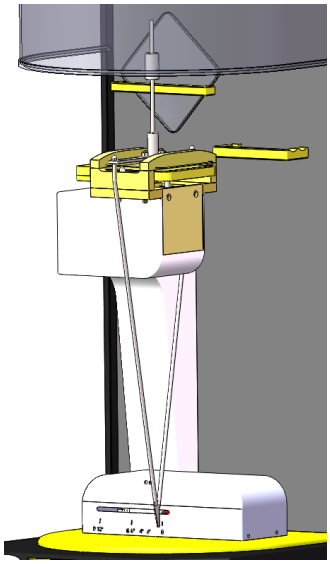

Figure12

König Pendulum test process is shown in Figure 13. The lever device will dial the swing pendulum to the position of 6 degrees, and then release the pendulum after the static setting, the pendulum will swing freely, and the counter and the timer begin to calculate at the same time. The pendulum gradually decays until the amplitude of the pendulum is reduced to 3 degrees, counting and timing are completed, and the measurement results are obtained.

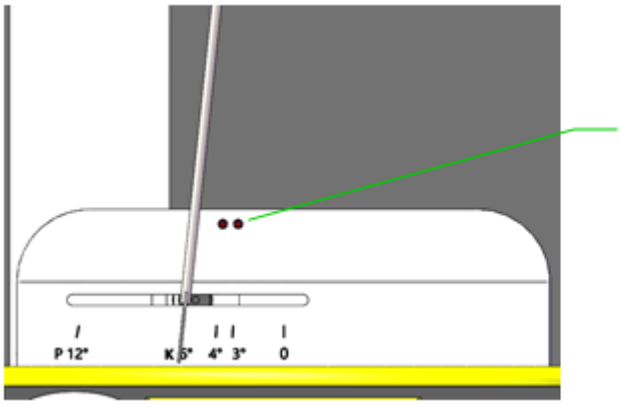

Figure13

9) Testing Result

In the main interface, the pendulum type will be displayed in real time, and the working state and test results are shown in Figure 14. If the data is automatically stored, you can also view all the test data shown in Figure 15 at the setting of the interface.

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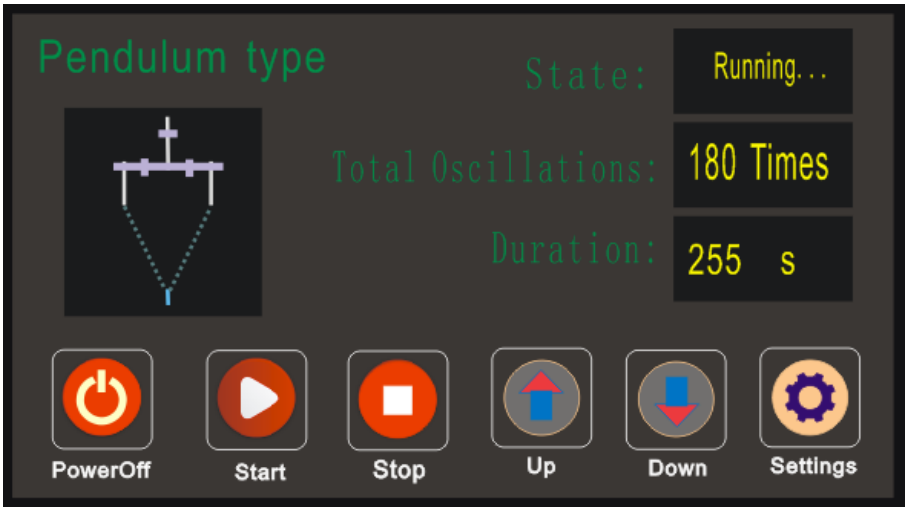

Figure14

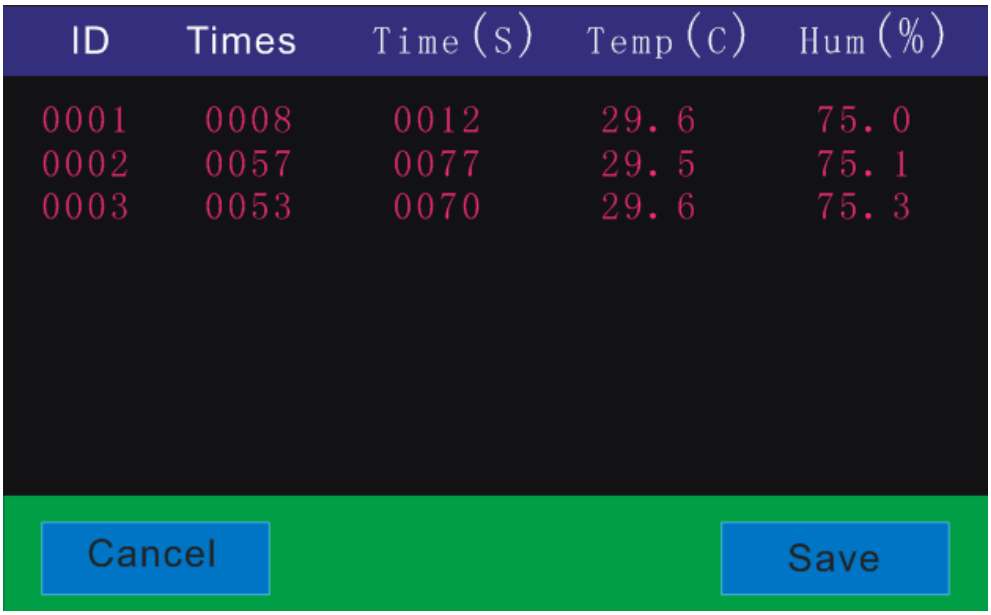

Figure15

Factors that affect the results of the testing:

*The level of the platform will affect the stability of the pendulum, and the level must be set as far as possible.

*The presence of air will affect the oscillating period of the pendulum. The cover must be closed and keep the environment free from wind when working.

*Planeness of the test panel, if the surface of the test panel is not smooth, the horizontal condition is invalid.

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*The swinging steel ball remains clean. Dirt or oil stains will affect the normal damping effect of the coating on the swing of the pendulum.

10) System Setting

Click the setting button in main interface to enter the setting interface (Figure 6) click the system button to enter the system settings (Figure 16) to set the screen brightness and open or close the buzzer and open or close automatic energy saving

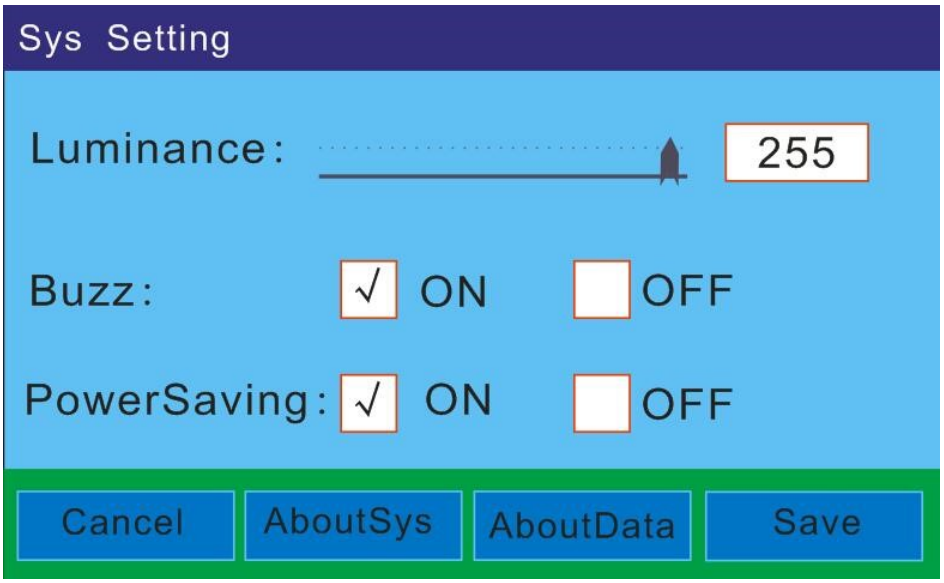

Figure16

Click on the system to view the serial number and software version of the instrument and date of production. (Figure17)

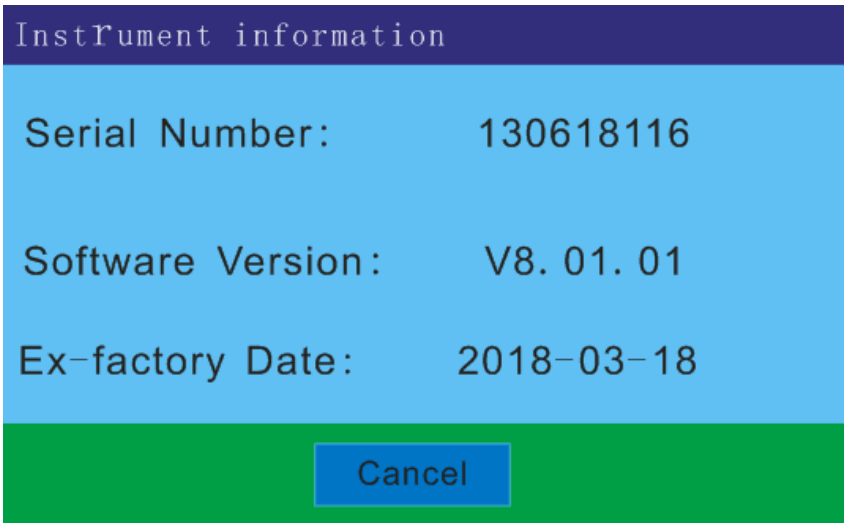

Figure17

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3.7 Instrument verification

The verification of the instrument shall be carried out according to the requirements of the 3.6 operation guide, and the standard glass panel shall be used for operation.

3.7.1 The whole testing should be carried out under the conditions of laboratory temperature and humidity (temperature 23±2° C, relative humidity 50±5%).
3.7.2 Clean the surface of the standard glass panel, clean the surface with a small amount of clean alcohol with cotton cloth. No oil stains or dirt can be found on the cleaning surface.
3.7.3 Put the standard glass panel on the test panel platform
3.7.4 Select the required pendulum, use cotton cloth to clean the surface of steel ball on the rotating shaft, test by 3.6 operation guide. The following table data are standard parameters. The test must be carried out in three different positions on the same standard glass panel. Finally, the average value is taken.

	PERSOZ Pendulum	König Pendulum
Swings period	1±0.01s	1.4±0.02s
Damping time on a standard glass panel	430±15s	250±10s
The number of oscillations on a standard glass panel	430±15	172-185

If there are obvious different results in the case of verification, it is necessary to check whether all the components are clean, the position is correct, and whether there are external causes affecting the operation (including temperature, humidity, level, air flow, vibration, etc.).

4. Calibration

4.1 BEVS1306 Pendulum Hardness Tester has been calibrated before the factory.
4.2 The calibration cycle is recommended for one year under normal use.
4.3 The Pendulum Hardness Tester takes the number of times and the time as the measurement result, and the state of the two pendulums directly determines the accuracy of the result. Calibration is used only by reference to standard parameters.
4.4 The calibration operation is calibrated according to the operation guide of the test

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before the test of instructions 3.6. If the deviation between the test results and the standard parameters is large, check whether the two pendulums are deformed or loosened, and any loosening of the pendulum or the abnormal connection will lead to a certain degree of change in the pendulum. If there is any looseness, then it cannot meet the standard requirement after locking. Please contact us for after sale service.

4.5 KONIG pendulum changes the swing period. The upper cylinder is a counterweight. As shown in the figure below, adjusting its height can change the swing interval.

KOENIG Pendulum Counterweight

4.6 The swings period cannot be changed by the pendulum.

5. Maintenance

The regular maintenance is required for BEVS 1306 Intelligent Pendulum Hardness Tester. This responsibility is borne by the customer, not a warranty obligation.

5.1 The two steel ball of Pendulum is wiped only when it needs cleaning.

5.2 After one day's operation, the two Pendulums should be placed on the dedicated idle rack, and avoid excessive collision when placed, don’t leave the testing panel in the machine.

5.3 After a day's test, it is necessary to clean up the workspace, avoid leaving foreign objects, and ensure that the sensors are not damaged.

5.4 The instrument must be kept clean, dirt or oil stains must be cleaned in time.

5.5 Ensure the lubrication state of each operating mechanism of the instrument, and use the lithium grease lubricating oil once every 1 year.

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6. Order Information

BEVS 1306 Intelligent Pendulum Hardness Tester (K and P)
BEVS 1306 /1 Intelligent Pendulum Hardness Tester (K)
BEVS 1306 /2 Intelligent Pendulum Hardness Tester (P)

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