C-Tech
Laboratory equipment co..limited

Digital Liquid Plastic Limit United Device DLP-100B

PRODUCT MANUAL

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I. Application

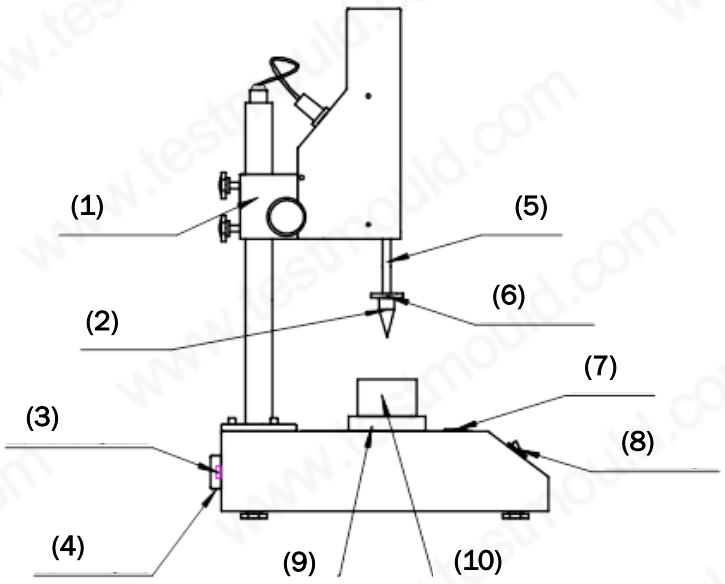
Digital Liquid Plastic Limit United Device is used to determine liquid and plastic limits of soil, thus to provide reliable data to classify soil types, calculate natural consistency and plasticity index. Digital display technology is adopted for this machine and automatic measurement can be performed.

II. Main Technical Parameters

Max. measuring range	40mm error: 0.05mm
Resolution	0.01mm
Cone weight	76±0.05g; 100±0.05g
Cone angle	30°±0.2°
Power	220V, 50HZ
Sample cup	Internal dia. 50 x 40mm

III. Structure

The configuration and structure of Digital Liquid Plastic Limit United Device please see Figure 1.



(1) Lifting frame
(2) Cone
(3) Printer interface
(4) Power port
(5) Cone rod
(6) Counterweight
(7) Bubble level
(8) Power switch
(9) Base plate
(10) Sample cup

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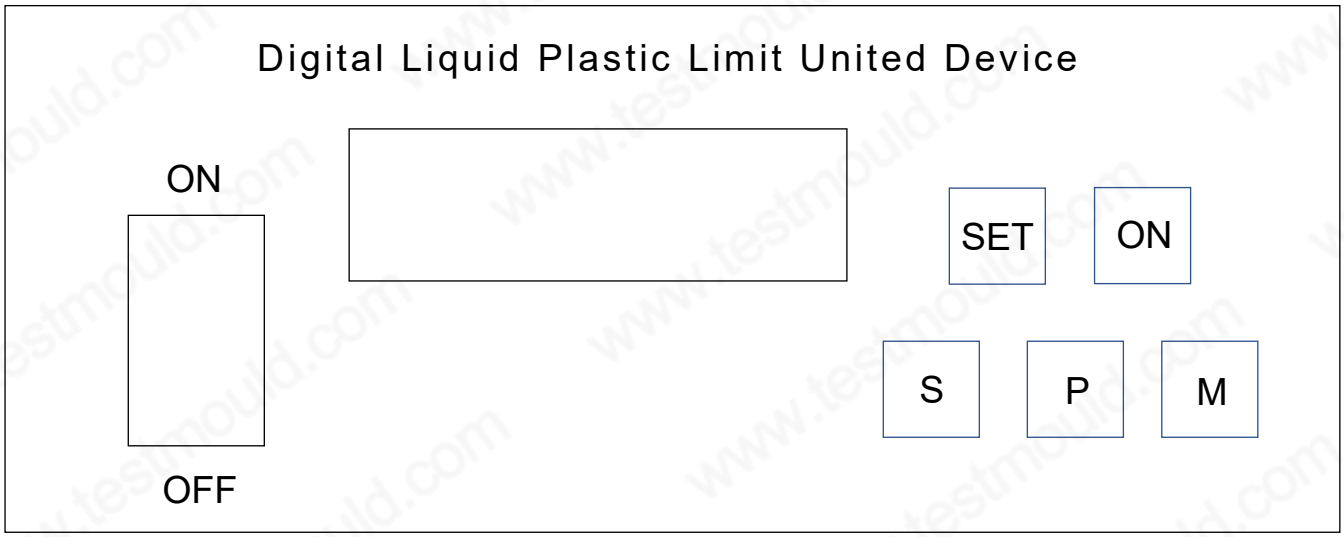
IV. Installation

After unpacking a new instrument, inspect the instrument and accessories for damage. Place the main unit on a level platform and turn on the power. Loosen the bolt on the back of the instrument, lift the entire lift assembly up, and tighten the bolt.

V. Key function



ON: Press to start the test

SET: This key is used to set the test time and switch the function of the contact between the cone and the soil sample surface. Press this key, the LCD screen will display "t 5.0", indicating that the set test time is 5 seconds. Press P or S. Displaying "t 15.0" means that the set time is 15 seconds. Press the button continuously to switch the set time between 5 seconds, 15 seconds, 30 seconds and 60 seconds.

"E ON" means the cone lock function is on. At this time, press the “ON” button to drop the cone, which can prevent the cone from being accidentally triggered to fall and damage the tip of the cone;

"E OFF" means that the cone lock function is turned off. At this time, press the "ON" button, the cone will not fall immediately. When the cone tip touches the surface of the specimen, the test will be automatically started and the cone will fall automatically.

(Press "S" or "P" to toggle OFF and ON.)

M: Press this key, the electromagnet that locks the cone rod is pulled in, and the cone rod is no longer locked. Release the key and the cone rod is locked.

S: After completing a test, press this key to save the data into the instrument memory. After three times of storage, the LCD screen will display the average of the three tests.

P: After completing the test, press this key to print the test results. Please confirm that the model you purchased has a printer interface and is equipped with a micro printer, otherwise this key will not work.

VI. Operation

(1) Take representative natural moisture content or air-dried soil samples for testing. If the soil contains particles larger than 0.5mm or many inclusions, air-dried soil samples can be used. Grind with a pestle with a rubber tip or crush clods with a wooden stick over the rubber stem. It is necessary to repeatedly grind and sieve until all the clods that can be ground pass through the 0.5mm sieve. Take the soil sample under the sieve and prepare the sample by the three-dish method or the one-dish method.

A. Three-dish method: Take about 200g of soil sample under the sieve and put it into three dishes separately. Add different amounts of distilled water or tap water with a straw, so that the water content of the soil samples is controlled at the liquid limit, above the plastic limit and near their intermediate states. Mix thoroughly with a soil mixing knife, cover with a damp cloth, and leave it for more than 18 hours.

B. One-dish method: Take about 100g of soil sample under the sieve and put it into a dish. Water was added according to the three-dish method to prepare samples, and the water content of the soil samples was controlled above the plastic limit. As described in (2) to (4), determine the depth of soil penetration and water content at the first point. Then add water in sequence, and measure the water content and depth of soil penetration at the second and third points according to the above method. The water content of the soil samples at the two points should be controlled at the liquid limit, the intermediate state of the plastic limit, and near the liquid limit, respectively. After adding water, it should be fully stirred evenly, and the time for leaving it can be appropriately shortened.

(2) Stir the prepared soil sample well, put it into the soil sample cup in layers, and press it hard to let the air escape. For dry soil samples, it should be fully rubbed first and then compacted

repeatedly. When the sample cup is full, scrape it flush with the rim of the cup.

(3) Plug in power, level the instrument, turn on the switch, and install the cone.

(4) Place the loaded soil sample cup on the base plate, and adjust the lifting knob to make the cone descend slowly, so that the soil sample surface and the cone are just in contact. (In “E OFF” state, when the cone is not in contact with the soil sample surface, press the ON, the cone will not fall). At this time, stop turning the knob, press the start button, the sensor will be cleared, and the cone will sink immediately. After 5S, the cone penetration depth is displayed on the LCD. Data display time is at least 5 seconds. After the test is completed, hold the cone upwards and reset the cone (there is a thread on the upper end of the cone, which can be matched with the thread of the measuring rod).

(5) Change the contact position between the tip of the cone and the soil (the distance between the tip of the cone and the soil is not less than 1cm). Repeat the (4) to measure the depth of the cone into the sample, with an allowable error of 0.5mm, otherwise, it should be redone.

(6) Remove the Vaseline where the tip of the cone is in the soil. Take two soil samples of more than 10g, put them into the weighing box respectively, and weigh them (accurate to 0.01g) to determine their water content ω.1, ω.2, (calculated to 0.1%). Calculate the average water content ω.

(7) Repeat (2) to (4) to test the soil sample with water content, and measure its cone penetration depth and water content.

VII. Equipment debugging

(1) After unpacking, check whether the instrument has failed due to shipping.

(2) Plug in the power and turn on the power. At this time, the display shows the data "05", which means the timing is 5S.

(3) In order to ensure the measurement accuracy of the instrument, press ON of the instrument after 20 seconds of power on, and the cone connecting rod should fall freely at this time.

(4) Level the instrument, the method is as follows: rotate the feet, to make the level bubble in the center, then the working plane is horizontal.

VIII. Matters need attention

- In the test, after the cone and rod falling down, when it needs to be lifted again, just push the rod up slightly and it can be locked automatically.
- When the sample cup is placed on the base plate of the instrument, it should be gently placed flat and not collided with the base plate. It should also avoid the collision of other metals and other objects with the workbench, which helps to maintain the flatness of the base plate.
- After each test, the assembled cone should be removed, wiped dry with cotton or cloth, and stored in a dry place.
- Clean the base plate and the sensor rod, and cover the instrument with a clean cloth.
- Without the consent of the manufacturer, the user is not allowed to disassemble the instrument to avoid damage.
- The counterweight should be screwed in place on the thread on the top of the cone, with moderate force but not too much.
- Before and after the test, the measuring rod should be kept clean.
- If the power supply voltage is unstable and appears "crash", and all function keys are ineffective, please turn off the power, and restart it after 3 seconds.
- To ensure safety, please pay attention to grounding.

IX. Calibration

Remove the cap, and unscrew the connecting screw between the digital display ruler and the lock nut. Push the electromagnet to release the rod locking, and turn the rod to remove the rod, counterweight, cone, locking screw, digital display ruler, and connecting screw.

The weight of the weighing rod, cone, locking nut, digital display ruler, and connecting screw, 76±0.05g is qualified.

If the weight is acceptable, install the tightening screw into the copper sleeve on the platform. Make the electromagnet thread the rod and the tightening screw. Put the copper clip on the digital display

meter into the digital display meter, install the digital display ruler correctly, and connect the digital display ruler and the tightening screw with screws.

Install the instrument cap.

Press "SET" and switch to "E ON" to enter the test mode. (Press the "S" or "P" to switch between OFF and ON.) After modification, press "Set" to return to the time display interface.

After setting, put the standard gauge block directly under the cone, press "M", the cone will drop. The LCD screen displays the range, and the error of 5 tests is ±0.1mm, which is qualified.

After the test, change the "E" mark to "OFF", which means that the instrument has the function of detecting whether the cone is in contact with the soil sample surface.

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