C-Tech
Laboratory equipment co..limited

CTM-02 CBR TESTER

PRODUCT MANUAL

C-TECH LABORATORY EQUIPMENT CO., LTD

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I. Purpose and scope of use

The CBR tester is used to test the load-bearing ratio of various soil and pavement base and bottom materials after making specimens in the prescribed test mold. This test complies with JTGE40-2007 standard and JTJ051-93 highway geotechnical test regulations.

The maximum particle size of the mixture should be controlled within 25mm, and the maximum size should not exceed 40mm.

II. Main parameters

Speed: 1mm or 1.27mm/min. Can be set by yourself. Factory setting is 1mm/min

Fast speed: 15mm/min

Maximum load: 50kN, accuracy 0.001KN

Penetration rod: the diameter of the end face Φ50mm.

Displacement sensor: 0-25mm graduation value: 0.01mm linearity: 0.3%.

Perforated top plate: 1 piece, perforated bottom plate: 1 piece.

Load plate: 4 pieces (outer diameter Φ150mm, inner diameter Φ52mm, 1.25kg per piece).

Test mould: inner diameter Φ152mm, height 170mm.

Power supply voltage: 220V.

III. Main features

- 7-inch color touch screen display, with curve display, data storage and printing.
- Meet the following standards:

  BS 1377-4, ASTM D1883 and T0134-1993.
- Deformation recording points and loading speed can be set arbitrarily to meet the needs of different test standards.

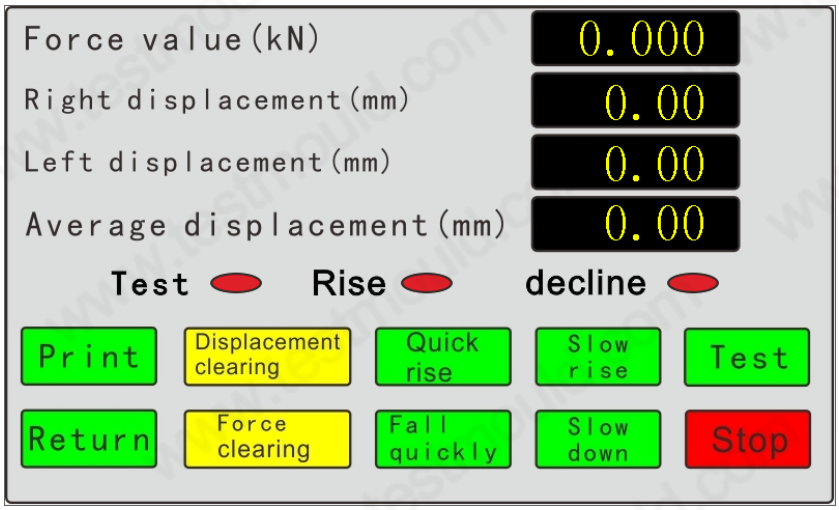
- With data processing function, CBR value can be calculated automatically.
- Servo motor control, with software speed feedback, loading speed adjustment.
- Built-in micro-printer can print data stream list and test results.
- Data can be uploaded (optional).

IV. Operation interface

1. Turn on the power, the device displays the main interface as shown in the figure below.

2. Press the 

to enter the test interface as shown in the figure below.



Press the Displacement clearing to reset the displacement.

Press the Force clearing to reset the force value.

Press the Quick rise, the motor will rise quickly.

Press the Fall quickly, the motor will descend quickly.

Press the Slow rise, the motor will rise slowly.

Press the Slow down, the motor will descend slowly.

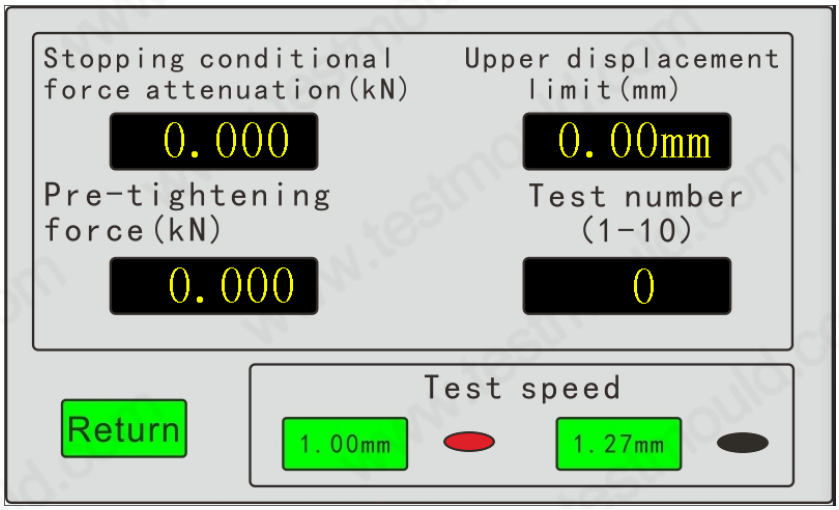
Press the Test to start the test, and the test will stop when the test displacement is reached or the specimen is broken.

Press the Print to print the test result.

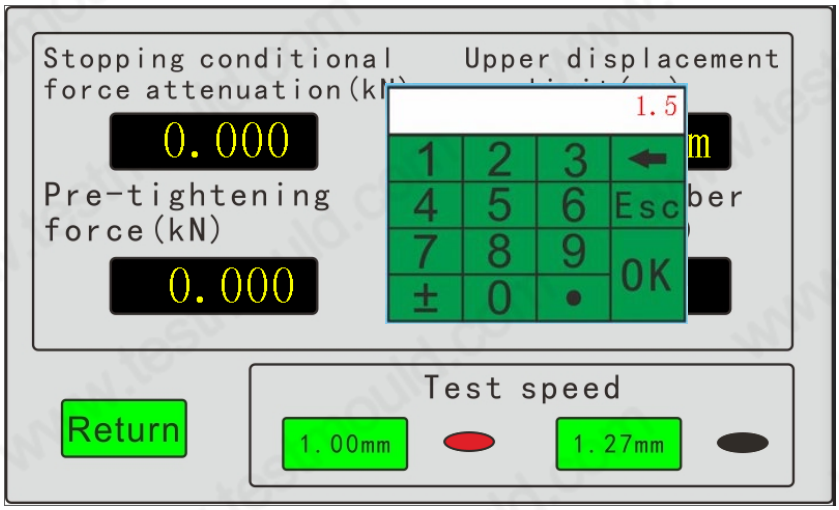
Press the Stop to stop the motor rotation.

Press the Return to return to the main interface.

3. Press the Test parameter setting to set the test parameters as shown in the figure below.



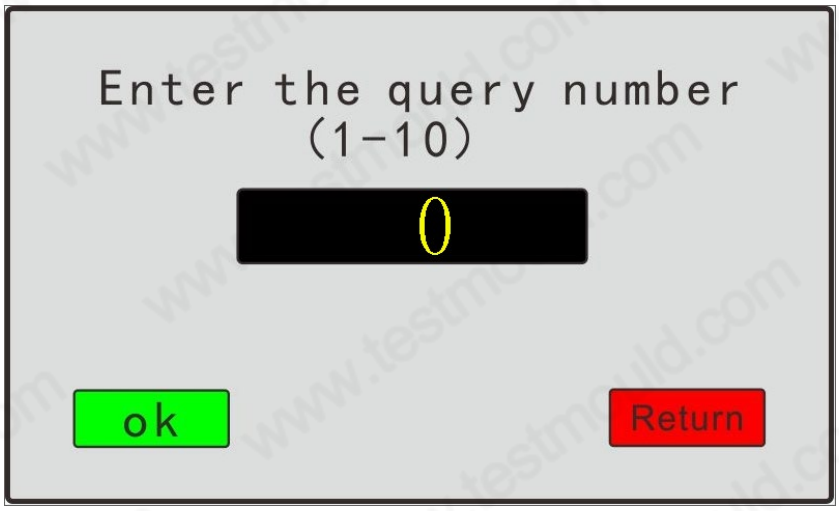
Set the test parameters according to the test requirements, touch the position of the parameter to be set to enter the setting as shown in the figure:

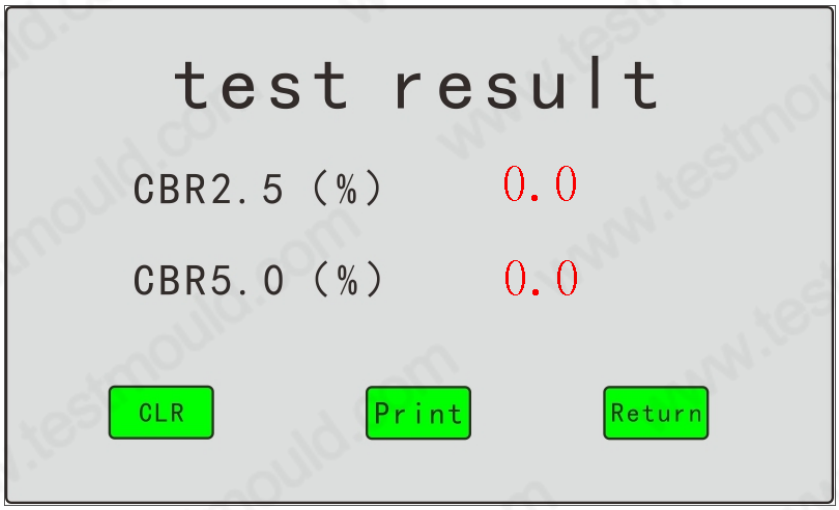


Enter the value and press the OK to complete the setting. Press the Return to return to the main interface.

4. Press 

to query the test results as shown in the figure, and then enter the number to query.





Press the 

to clear the test result.

Press the 

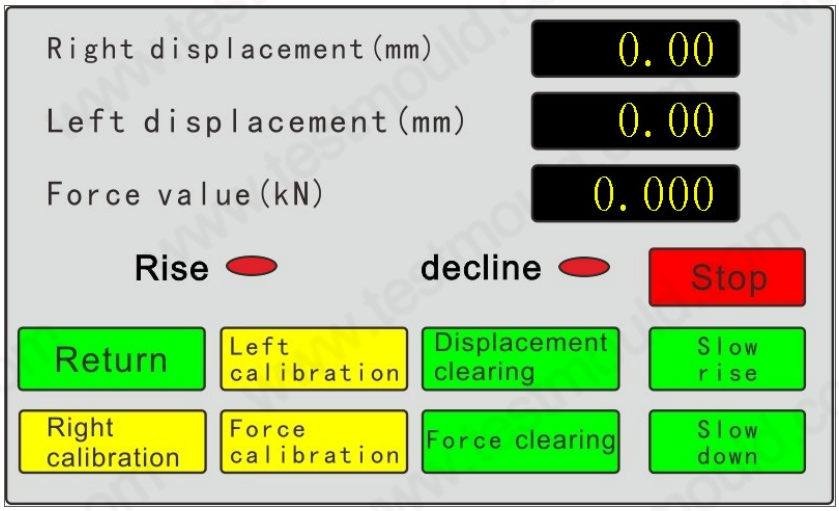
to print the test result.

Press the 

to return to the main interface.

5. Press the 

, enter the password 8888 to enter the system calibration as shown in the figure.



Displacement calibration: install the displacement sensor on the calibration platform, press the 

to clear the displacement, then pad the standard displacement block, and press 

to calibrate the displacement of the standard displacement block.

Force calibration: Install the calibrator and force sensor, and reset the force value of the equipment and calibrator when the force is not applied. Then apply force to the sensor, press the 

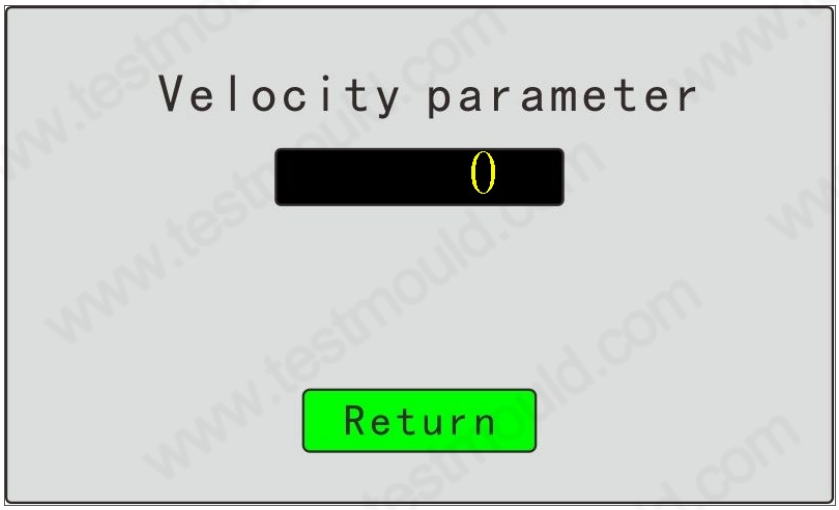
, and enter the force value according to the value of the standard calibrator to complete the calibration.

Press the 

to return to the main interface.

6. Press the 

, enter the password 8888 to enter the system setting as shown in the figure.



Press the Return to return to the main interface.

V. Test steps

1. Weigh the mass of the test mould (m_1), fix the test mould on the bottom plate, put the cushion block into the mould, put a piece of filter paper on the cushion block, and install the lantern ring.

2. Test the sample according to the specified number of layers and the number of blows per layer to find the maximum dry density and optimal moisture content of the sample.

3. Prepare 3 specimens according to the optimal water content of the remaining samples. Spread a portion of the sample in the metal pan, and spray evenly on the sample according to the amount of water calculated in advance.

Mix the sample thoroughly, and then put it in a closed container or plastic bag to soak for use.

Soaking time: heavy clay should not be less than 24h, light clay can be shortened to about 12h. Sandy soil can be shortened to 1h, and natural gravel can be shortened to about 2h. When preparing each specimen, the water content of the sample must be measured.

Note: When necessary, three dry density specimens can be prepared. If 3 specimens of each dry density are made, 9 specimens are made in total. The number of hits per layer is 30, 50, and 98, respectively, so that the dry density of the specimen is from less than 95% to 100% of the maximum dry density.

4. Put the test mould on the hard ground, and pour the prepared sample into the mould 3 to 5 times (depending on the maximum material diameter).

According to the five-layer method, each layer needs about 900% (fine-grained soil) ~ 1100% (coarse-grained soil); when according to the three-layer method, each layer needs about 1700g of sample(The compacted sample should be 1~2mm higher than 1/3 of the mould height).

Level the surface and press it tightly. The first layer of sample is compacted according to the specified number. When hitting, the hammer should fall freely and vertically, and the hammer traces must be evenly distributed on the sample surface.

After the first layer is compacted, the sample layer is "puffed" and then loaded into the sleeve. Repeat the above method to compact the remaining samples of each layer. After compaction, the sample should not be 10mm higher than the mould height.

5. Remove the lantern ring, use a spatula to smooth the compacted specimen along the top of the test mould, and repair the uneven surface with fine materials. Take out the cushion block and weigh the mass of the test mould and specimen (m_2).

VI. Steps to measure the swell increment by soaking in water

1. After the specimen is made, remove the broken filter paper on the top surface of the specimen, put a new filter paper, and install a perforated plate with adjusting rod on it, and add 4 load plates on the perforated plate.

2. Put the test mould and the perforated plate into the tank (without water), and use the pull rod to tighten the mold, install the dial indicator, and read the initial reading.

3. Pour water into the water tank to make the water freely enter the top of the specimen. During the soaking period, the water surface in the tank should be kept approximately 25mm above the top surface of the specimen. The specimen needs to be soaked in water for 4 days and nights.

4. At the end of soaking in water, read the final reading of the dial indicator on the specimen and calculate the swell increment:

Take out the specimen from the tank, pour out the water on the top surface of the specimen, and let it stand for 15 minutes to drain. Remove the additional load and perforated plate, bottom plate and filter paper, and weigh (m_3) to calculate the change in humidity and density of the specimen.

VII. Penetration test

1. Put the specimen after the water soaking test on the lifting table of the pavement material strength tester, adjust the eccentric ball seat so that the penetration rod is in full contact with the top surface of the specimen, and place 4 load plates around the penetration rod.

2. First apply a 45N load on the penetration rod, and then adjust the pointers of the dial gauges for measuring force and deformation to zero.

3. Make the penetration rod press the specimen at a speed of 1~1.25mm/min, and record the penetration of certain full readings (such as 20, 40, 60) of the dynamometer dial indicator. And pay attention to make more than 5 readings when the penetration is 250×10-2. Therefore, the first reading in the dynamometer should be about 30×10-2mm penetration.

Generally, the ratio of the unit pressure when the penetration is 2.5mm to the standard pressure is used as the material bearing ratio (CBR).

$$CBR = \frac{P}{7000} \times 100$$

In the formula: CBR-bearing ratio, %;

P-unit pressure, Kpa.

Calculate the bearing ratio when the penetration is 5mm:

$$CBR = \frac{P}{10500} \times 100$$

If the load-bearing ratio when the penetration is 5mm is greater than the load-bearing ratio when the penetration is 2.5mm, the test needs to be done again. If the result is still the same, the load-bearing ratio when the penetration is 5mm is used.

VIII. Maintenance

1. After each test, the instrument should be wiped clean immediately.

2. Replace the lubricating grease in the gearbox with new lubricating grease after one year of use, and maintain it regularly.

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