FRUITS & VEGETABLES
MULTIPLE DISPLAY UNIT-KG, LB, N & Pa
EASY ZERO ADJUSTMENT.
ACCURACY VERIFICATION

Thank you for your selection of this Fruit Hardness Tester. To ensure that you get the most out of the instrument, we strongly recommend you read and follow the instructions in this manual carefully.

1. FEATURES
* The Ripeness Tester is a hand-held compact penetrometer for fruit firmness and some vegetable hardness testing, the universally accepted measure of ripeness.
* The HFH80 series is the grower’s indispensable tool for knowing when to pick and ship.
* The HFH80 Fruit Tester measures the force required to push a plunger tip of specified size into the fruit pulp. The force reading assists in determining the appropriate picking time or monitoring fruit softening during storage.
* Because of the number of fruit and vegetable varieties, geographical locations and other variations, the appropriate firmness for harvesting will vary. Therefore HFH80 users must combine experience and expertise to establish the firmness value that applies to their specific variety and locale.
* Automatic power off to conserve power.
* Can communicate with PC for recording, printing and analyzing by the optional software and cable for RS232C interface.

2. A GUIDE TO SELECT THE MODEL
The model of HFH80 Fruit Testers to choose from 3 models is used with specific size penetrometer tips for testing ripeness of specific fruit.
HFH81
(3.5mm) Small Fruits, Soft Fruits, Hard Fruits
HFH83
(7.9mm) Larger Fruits, Firm Fruits, Hard Fruits
(11.1mm) Apple, Firm Fruits

Small Fruits: e.g. Strawberry, Cherry, Grape, Berries
Soft Fruits: e.g. Peach, Banana, Apricot, Plum, Melon, Citrus, Persimmon
FirmFruits: e.g. Pear, Nectarine, Kiwi
Hard Fruits: e.g. Avocado

3. SPECIFICATIONS
Display 4 digits, 10 mm LCD
Range:
- HFH81 0-5.0 kgf/cm² Tip size 3.5mm
- HFH83 0-11.0 kgf/cm² Tip size 7.9mm
Resolution: 0.01 kgf/cm²
Unit conversion:
- kgf (kgf/cm²)
- lbf (lbf/cm²)
- Pa
Accuracy: ± (1%H + 0.1) kgf/cm²
Power supply: 4x1.5 AAA size batteries

4. FRONT PANEL DESCRIPTIONS

5. MEASUREMENT PROCEDURES
Larger Fruits
A. Select an appropriate plunger tip for the commodity to be tested. See “A GUIDE TO SELECT THE MODEL”.
B. Select a random sample of 10 to 15 fruits of uniform size and the same temperature or 3% of the lot to be sampled. For best results, suggest one person should test the lot.
C. Remove a disc of skin on opposite cheeks of the fruit midway between the stem and bottom on sun and shade sides. Then proceed with puncture test.
D. Zero adjustment
Hold the HFH80 vertically with the plunger tip hanging in the air, the reading on the display should be 0. If not, depress the ‘ZERO’ key to make the HFH80 tester display “0”.
E. Hold the fruit against a hard surface and force the tip vertically into the pulp at a uniform speed (take about 3 seconds).
F. The tip should consistently penetrate to the break in tip size can be interchanged after tip size is chosen.
G. Record reading on the display.
H. If a maximum reading is needed, just press the key ‘MAX’ till the mark ‘Max’ shows on the display before taking measurements.
I. To take the next measurement, just press the key ‘UNIT’.
J. Unit conversion is controlled by depressing the key ‘UNIT’.
K. For the model HFH83, make sure the plunger tip is in accordance
with the tip size on the display. If not, press the key ‘7/9/11/12’ to choose. Smaller Fruits
Similar to large fruit testing except:
A. Make a puncture test on only one check midway between the stem and the bottom.
B. Removal of the skin is unnecessary.
C. Penetration should be sufficient to obtain peak reading. Repetitive testing is a perfect testing technique for small fruits.

6. BATTERY REPLACEMENT
A. When the battery symbol appears on the display, it is time to replace the batteries.
B. Slide the Battery Cover away from the tester and remove the batteries.
C. Install batteries paying careful attention to polarity.

7. MAINTENANCE
A. Before daily use, exercise the plunger in and out for 10 seconds to ensure the mechanism functions freely.
B. After daily use, clean the penetrometer tips. Carefully hold the tester with the load shaft pointing down under a slowly flowing water faucet for a few seconds, dry with a towel and allow to dry further by standing it with shaft pointing down.
C. The HFH80 tester should never be lubricated with oil since this will accumulate dust causing increased friction and decreased accuracy.

8. HOW TO SET THE TIME OF AUTO POWER OFF
The default setting for auto power off at the factory is 5 minutes. That means the tester will auto power off 5 minutes from the time of last key operation. Users can change it to any value between 0-9 minutes by following steps. Depress the POWER for about 4 seconds, release it after "OFF" shows on display, then press the key ‘MAX’ to preset the time as desired. To disable the function of auto power off, just preset the time to 0. The tester will only be shut down manually in such a case. To quit the time setting, just press the key ‘ZERO’.

9. ACCURACY VERIFICATION
Prior to use, the HFH80 tester accuracy should be verified by testing with known weights.

HFH80 accuracy can be easily verified by the following formula.

\[
P = N/S
\]

Here P is HFH80 reading, N is the force applied to the plunger tip and S is the area on which the force is applied.

Based on the above formula, coefficients are given for different models below.

<table>
<thead>
<tr>
<th>Model</th>
<th>Tip</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFH81</td>
<td>3.5mm</td>
<td>k=0.399</td>
</tr>
<tr>
<td>HFH83</td>
<td>7.9mm</td>
<td>k=2.041</td>
</tr>
</tbody>
</table>

Apply a force N to the tip. When readings are almost unchanged, press the key ‘MAX’ to hold the reading P which should satisfy the equation below.

\[
P = k \times N
\]
e.g. if applying 0.4 kgf to HFH81, the reading should be

\[
0.4 \times 10.399 = 4.16
\]
Max. deviation is ±(4.16 × 1% +0.1) =±0.14
so correct reading should lie in

4.16±0.14

10. COMMUNICATE WITH PC
A. Install the optional RS232C software to the PC.

**WARNING**

**PART 8 AND 9 ARE ONLY FOR SKILLED AND PROFESSIONAL PERSONNEL ONLY.**

Users are not suggested to try to carry out the operations in part 8 and part 9. Improper operation will lead to the HFH80 tester inaccurate, even could not work.

**RETURN REQUESTS / INQUIRIES**

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (R) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR WARRANTY REPAIRS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED;
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

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**WARNING**: These products are not designed for use in, and should not be used for, human applications.