



# HFH80 SERIES Fruit Hardness Tester

INSTRUCTION SHEET

M5080/0112

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Made in Taiwan



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

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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.

## General operation precautions



Accurate Fruit Testing Requires:  
Controlling tip penetration.  
Providing a means to verify gage accuracy.  
Controlling the speed of tip penetration.

## 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

Power off : 2 modes  
Manual off at any time  
Auto power off after 5 minutes from last key operation

Operating conditions:  
Temperature : 0-45°C  
Humidity : below 90% RH

Dimensions:  
204x62x33mm or  
8.0x2.4x1.3 inch

Weight:  
230g (not including batteries)

Standard accessories included :  
Carrying case .....1 pc.  
Operation manual..... 1 pc.

Optional accessory:  
Cable and software for RS232C and USB  
P/N: HFH80-SW

## 4. FRONT PANEL DESCRIPTIONS



- 3-1 Display
- 3-2 Power key (Multifunctional)
- 3-3 Unit conversion
- 3-4 Tip selection (HFH80 only)
- 3-5 Max hold key
- 3-6 Zero
- 3-7 Plunger tip
- 3-8 RS-232C interface
- 3-9 Battery compartment

- 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 chose from 3 models is used with specific size penetrometer tips for testing ripeness of specific fruit.

- HFH81 (3.5mm) Small Fruits, Soft Fruits, (7.9mm) Larger Fruits, Firm Fruits ,Hard Fruits
- HFH83 (11.1mm) Apple, Firm Fruits Small Fruits: e.g. Strawberry, Cherry, Grape, Berries
- Soft Fruits: e.g. Peach, Banana, Apricot, Plum, Melon, Citrus, Persimmon
- Firm Fruits: e.g. Pear, Nectarine, Kiwi
- Hard Fruits: e.g. Avocado

## 3. SPECIFICATIONS

Display 4 digits, 10 mm LCD

- Range:
  - HFH81 0.2-5.0 kgf/cm<sup>2</sup> Tip size 3.5mm
  - HFH83 0.2-11.0 kgf/cm<sup>2</sup> Tip size 11.1mm 0.4-22.0 kgf/cm<sup>2</sup> Tip size 7.9mm
- Tip size can be interchanged after tip size is chosen.

Resolution:  
0.01 if reading < 10  
0.1 if 10 < reading < 99.9  
1 if reading > 100

Unit conversion:  
kgf (kgf/cm<sup>2</sup>)  
lbf (lbf/cm<sup>2</sup>)  
N (N/cm<sup>2</sup>)  
Pa

Accuracy: ± (1% H + 0.1) kgf/cm<sup>2</sup>  
Power supply: 4x1.5 AAA size

## 5. MEASUREMENT PROCEDURES



### Larger Fruits

- Select an appropriate plunger tip for the commodity to be tested. See "A GUIDE TO SELECT THE MODEL".
- 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.
- 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.
- 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 diameter or to the scribed line on some tips.
- 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. The appearance of mark 'Max' is controlled by the key 'MAX'.
- I. To take the next measurement, just depress the 'ZERO' key and repeat steps from E to G.
- 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 '7.9/11.1' to choose.

### Smaller Fruits

- Similar to large fruit testing except:
- Make a puncture test on only one cheek midway between the stem and the bottom.
  - Removal of the skin is unnecessary.
  - Penetration should be sufficient to obtain peak reading. Repetitive testing is a perfect testing technique for small fruits.

### 6. BATTERY REPLACEMENT

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

$$=4.02-4.30\text{kgf}$$

But if applying 11.0 kgf to HFH83 (7.9mm) the reading should be

$$11 \times 2.041 = 22.45$$

Max. deviation is

$$\pm(22.45 \times 1\% + 0.1) = \pm 0.32$$

so correct reading should lie in  $22.45 \pm 0.32$

$$= 22.13 - 22.77 \text{kgf}$$

If the deviation is beyond its accuracy, Depress Power key and not release it till 'CO' appears on the Display. It takes about 6 seconds from starting depressing Power key. Then adjust the reading P by the 'MAX' key (increase) or 'UNIT' key (decrease) to the desired value. store that value and quit by pressing Zero key.

### 10. COMMUNICATE WITH PC

- Install the optional RS232C software to the PC.

### 7. MAINTENANCE

- Before daily use, exercise the plunger in and out for 10 seconds to ensure the mechanism functions freely.
- 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.
- The HFH80 tester should never be lubricated with oil since this will accumulate dust causing increased friction and decreased accuracy.

- Connect the tester to the COM or USB port of the PC with the optional RS232 cables. To connect to a USB port, a USB adaptor is required.
- Run the software on the desktop and select the COM port or USB port in the system settings.
- Click the button of data collection, then click the button of Begin/Continue.

### ⚠ 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.

### 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 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  
S is the area on which the force is applied.

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

Model	Tip	Coefficient
HFH81	3.5mm	k=10.399
	7.9mm	k=2.041
HFH83	11.1mm	k=1.053

### WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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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

$$\pm(4.16 \times 1\% + 0.1) = \pm 0.14$$

so correct reading should lie in  $4.16 \pm 0.14$

### 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 (AR) 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** RETURNS, please have the following information available BEFORE contacting OMEGA:

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

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

- Purchase Order number to cover the COST of the repair,
- Model and serial number of the product, and
- Repair instructions and/or specific problems relative to the product.

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