(주)해아림
SUNFOREST

dicsa
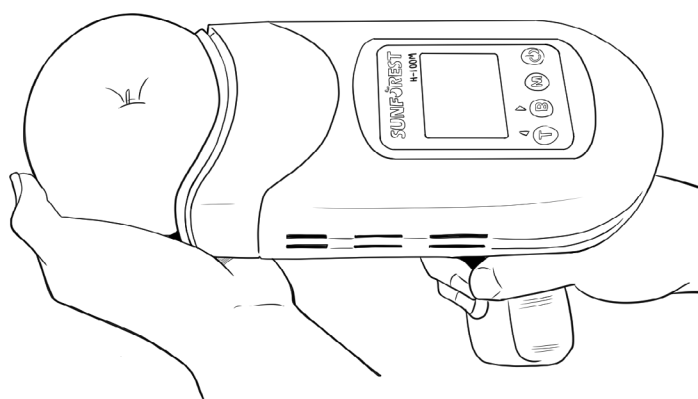Distribuciones Industriales y Científicas S.L.
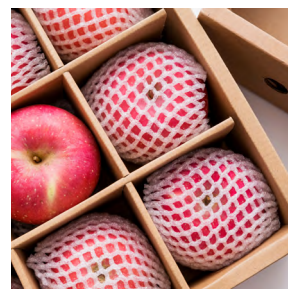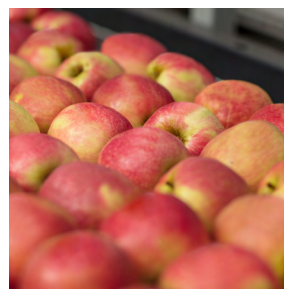**ciencia e innovación**

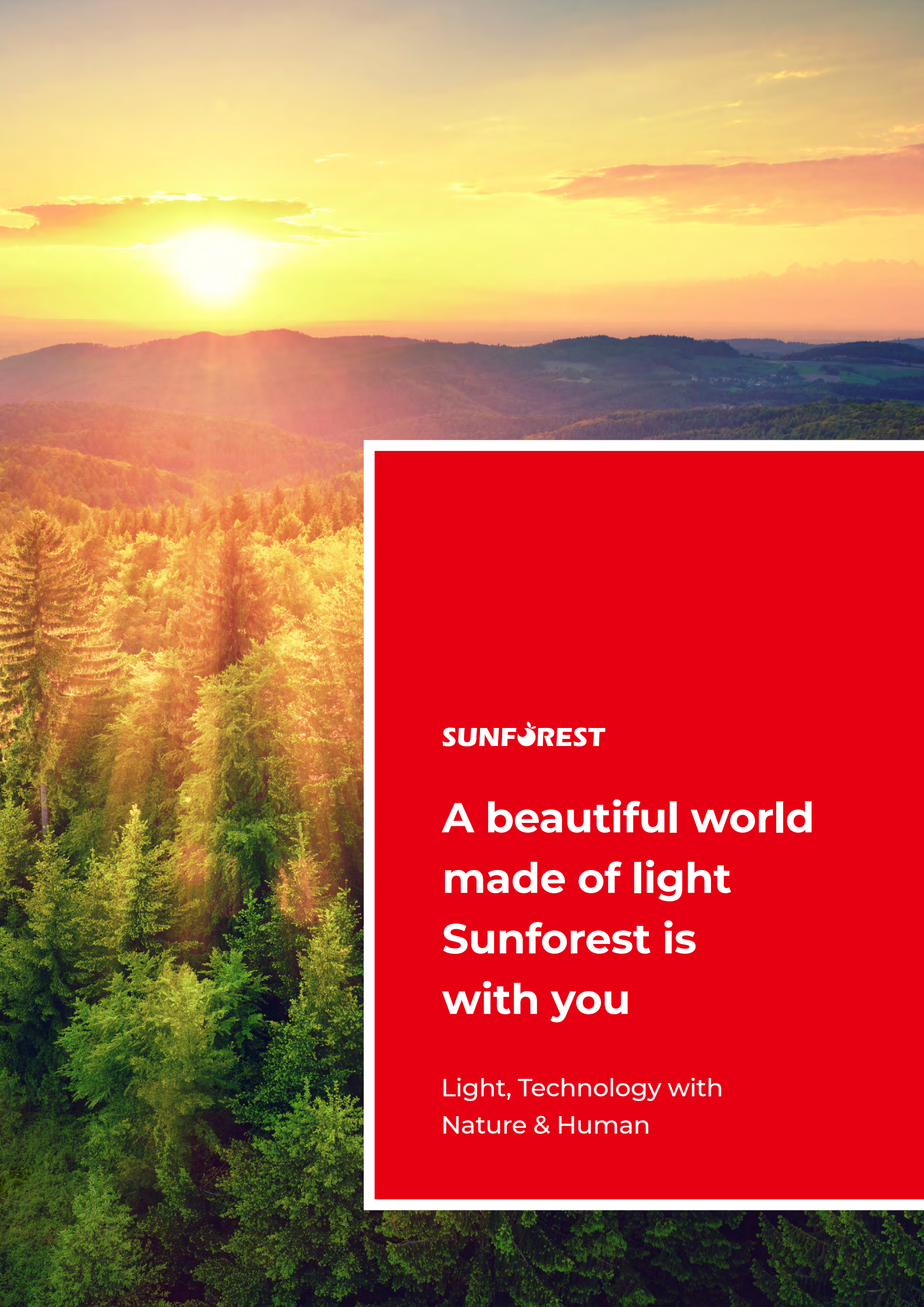# Portable
# Non-Destructive
# Fruit Quality Meter

SUNFOREST
## H-100 SERIES

**From grower to fresh market**
A useful tool determining produce quality at every application

**SUNFOREST**

# A beautiful world made of light Sunforest is with you

Light, Technology with
Nature & Human

SUNFOREST, a Korean developer specialized in NIR spectroscopy technology, is known as one of the leading company in the field of non-destructive and Chemometric-based measurement instrument for agriculture industry. Previously, SUNFOREST was the supplier of NIR spectroscopy sensors for non-destructive sorting systems to domestic market.

Now, SUNFOREST is emerged as a market leader of portable NIR spectrometers that non-destructively measuring fruit's internal quality. Applications of NIR spectroscopy are widely expanding in agricultural areas, and SUNFOREST makes pioneering developments in this nondestructive quality meter business.

SUNFOREST provides superior product service based on optical sensingand ICT convergence technology and explores spectroscopic instruments in agriculture industry.

The company is now trying to secure the first mover advantage and wish to be the foremost specialist in the field of nondestructive quality analyzer.SUNFOREST will do own best effort to satisfy client's requirement and always welcome to meet new business opportunities with great passion.

## SUNFOREST's Core Technology

- ICT Convergence Technology
- Spectroscopy Analysis & Optical Sensing
- Optical Packaging & Integration
- Chemometric Based Analysis Algorithm

**ABOUT US**
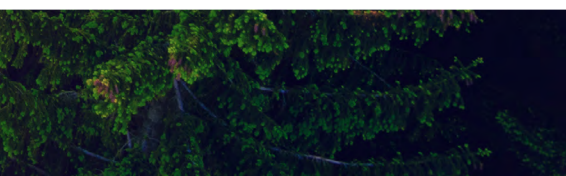
# SUNFOREST H-100 Series

**The SUNFOREST H-100 series** is a range of field portable NIR spectrometer that can non-destructively measure internal quality of fruits such as Brix, Dry Matter, Moisture, Browning, etc.

The H-100 series can be widely used from orchard to fresh market as a useful tool determining produce quality at every application. It could provide very simple and rapid bulk testing, helping growers to determine when to harvest on orchard and also allowing supply chains to carry out import inspections.

**MULTIPURPOSE INSTRUMENT APPLICABLE FOR VARIOUS FRUITS**

### H-100C

Mandarin, Kiwifruit, Avocado, Plum, Potato, Corn, Tomato

### H-100F

Apple, Pear, Peach, Persimmon, Mango, Citrus, Grape

### H-100M

Mini-watermelon, Melon

# Device Description

## Device Body



**Body**
(H-100F)

- Front Panel
- USB port
- Trigger
- Hand Grip
- Power



**Header**
(H-100F)

- NIR Spectrometer Sensor
- Lamp
- Lamp



**Safety Cap**
(White Teflon)

SUNFOREST

# Front Panel



Display Screen

Data Reset Key

Power On/Off

Menu Navigation

RFID Key

# Display Screen



Normal Operation

No. of Meter Readings

Offset Adjust

Temperature (Internal)

Battery Level

Measurement Value
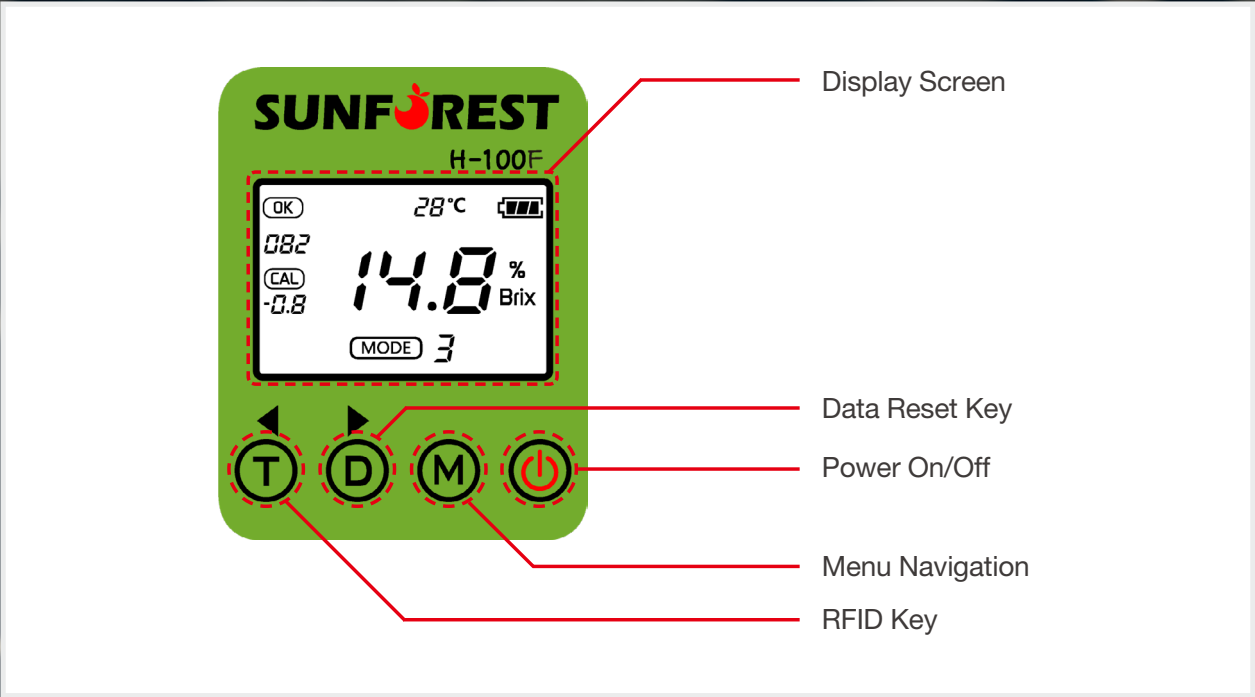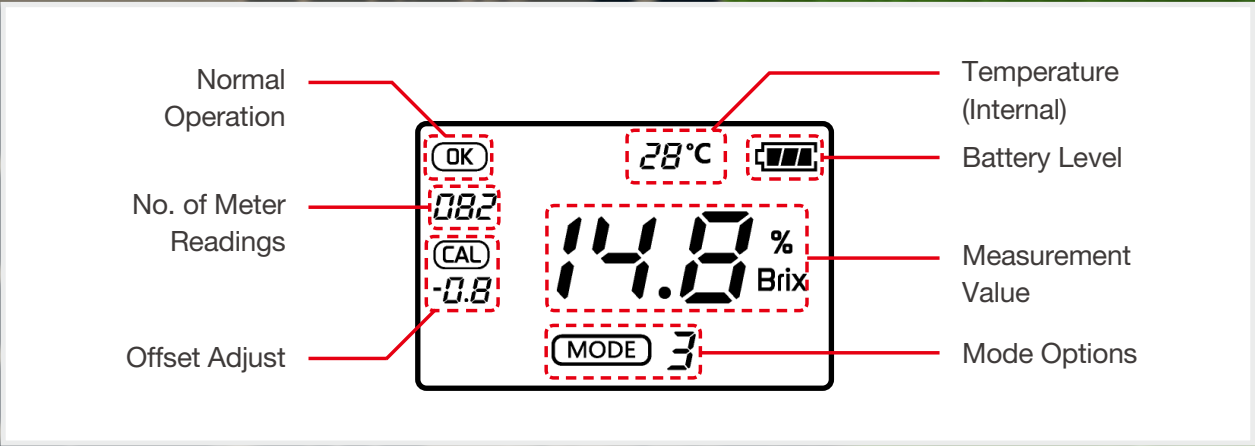
Mode Options
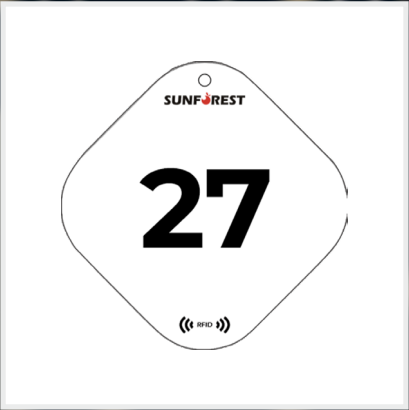
# RFID Tag by Option



# Accessory



Sunshield Rubber

# SUNFOREST H-100C / H-100F / H-100M

## Specifications

| Model No. | SUNFOREST H-100C/F/M |
|---|---|
| Sensor Type | Enhanced CMOS Spectrometer (640-1050nm) |
| Spectral Resolution | 20nm (FWHM) max. |
| Spectral Sample Size | 2.3nm |
| Light Source | Halogen lamp |
| Measurement | SSC(Brix), Dry Matter, Moisture, etc |
| Measurement Speed | ~2.0 sec. |
| Data Interface | USB C-type / Bluetooth 4.0 BLE (Smartphone) |
| Display | TN LCD (45x30mm) |
| Battery Life | 3000+ measurements |
| Battery & Power Source | Rechargeable Li-Ion Battery 3500mA, 12VDC/1.5A |
| Operating Environment Temp. | 5~45℃, 85% RH (Fruit temp. 5~30℃) |
| Measurement & Weight | 110x192x172mm(WxLxH), 440g |
| Other Supplies | Compatible with RFID tag<br>Smartphone App (Android and iOS)<br>CE, FCC certified |

※ Specifications are subject to change without prior notice

## Features

- Up to 1,000 scans
- A reference tile to ensure ongoing accuracy
- Ability to analyse spectra for in-depth statistical analysis
- Bluetooth pairing to mobile device for better result visualization



- RFID tag scanner
- Stores up to 5 models
- Temperature compensation
- Effective at rejecting scans with light interference

# Potential Uses



### Growers/Orchard
Pre-harvest Ripeness Judgment



### Pack House
Quality grading and sorting



### Supply Chain/Retailer
Import inspection



### Agriculture Institute
Pre-harvest evaluation / Harvesting quality report



### Seed Company
Growth quality monitoring / Harvesting quality inspection for breeding

# User Testimonials



### Hani Orchard, a Zespri Kiwifruit Grower in New Zealand

"The SUNFOREST H-100C is a must-have management tool for kiwifruit growers and packhouses. No more paying for multiple destructive tests to see how your crop is progressing. Accurate tests are completed in seconds on the spot."



### From the Eurofins' report on New Zealand Avocado Grower's Journal (Avoscene Dec.2020)

The SUNFOREST H-100C could be used by growers and industry technical reps to independently and non-destructively monitor NZ 'Hass' avocado dry matter on-orchard throughout the season. It could replace existing destructive monitoring. This could allow growers and packhouses to determine when to submit samples for maturity clearance testing. It may also be used for independent research / investigation of trials involving fruit quality.



### Shine-muscat grower in Kimcheon Korea

"The SUNFOREST H-100F is very useful to determine Brix level of shine-muscat grape, fast and consistently.
This device became an essential tool to grape growers as we could decide right timing to harvest."

**SUNFOREST H-100C**

# Kiwifruit DM/Brix Meter

## SUNFOREST H-100C : Kiwifruit

| Object Fruit | Kiwifruit (Gold, Hayward) |
|---|---|
| Quality Metrics | Dry Matter, Brix |
| Measurement Accuracy | Dry Matter : ±1.0% <br> Brix : ±1.0% |
| Repeatability | Dry Matter : ±0.5% <br> Brix : ±0.5% |

The H-100C comes with a demonstration model.
Model performance may vary across variety, temperature, and seasonal change.

# Applications

- Tracking / Monitoring of DM/Brix throughout  the season

- Investigations on effect of location and orientation of fruit on tree

- DM/Brix variability in tree location on orchard (spatial) or trees with different age or health

- Which orchard management methods may affect DM/Brix on an orchard

- Pre-maturity clearance screening



## GPS-it Mobile App

Interfaced with H-100C via Bluetooth, Landkind Mobile App displays measurement data to smartphone and into cloud storage. Visualized measurement data presented on orchard map indicates DM values along the path of samplings.

(Landkind App is applicable in New Zealand only.)

⌂  **www.landkind.com**

# Kiwifruit
# Photo Story

**SUNFOREST H-100C**

# Avocado DM Meter



## SUNFOREST H-100C : Avocado

| Object Fruit | Hass avocado |
|---|---|
| Quality Metrics | Dry Matter |
| Measurement Accuracy | Dry Matter : ±1.0% |
| Repeatability | Dry Matter : ±0.5% |

The H-100C comes with a demonstration model.
Model performance may vary across variety, temperature, and seasonal change.

# Applications

- Tracking / Monitoring of Dry Matter throughout the season
- Investigations on effect of location and orientation of fruit on tree
- Dry Matter variability in tree location on orchard (spatial) or trees with different age or health
- Which orchard management methods may affect Dry Matter on an orchard
- Pre-maturity clearance screening



## GPS-it Mobile App

Interfaced with H-100C via Bluetooth, Landkind Mobile App displays measurement data to smartphone and into cloud storage. Visualized measurement data presented on orchard map indicates DM values along the path of samplings.

(Landkind App is applicable in New Zealand only.)

⌂ **www.landkind.com**

# Avocado Photo Story
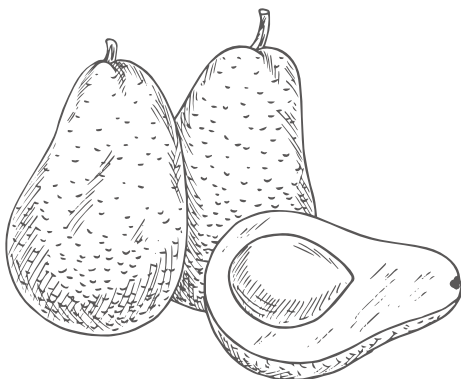
**SUNFOREST H-100C**

# Mandarin Brix Meter

## Story

Non-destructively measures brix level of mandarin and accurately predict harvest timing. The H-100C became a must-have management tool for citrus grower in Jeju island in Korea.



## SUNFOREST H-100C : Mandarin



| Object Fruit | Mandarin,  Korean Citrus |
|---|---|
| Quality Metrics | Brix |
| Measurement Accuracy | Brix :  ±0.5% |
| Repeatability | Brix :  ±0.5% |

The H-100C comes with a demonstration model.
Model performance may vary across fruit variety, temperature, and seasonal change.

**SUNFOREST H-100C**

# Tomato Brix Meter

## Story

Non-destructively measures brix level of tomato and accurately predict harvest timing. The H-100C is being used by seed producer in Netherlands.

## SUNFOREST H-100C : Tomato

| | |
|---|---|
| **Object Fruit** | Tomato |
| **Quality Metrics** | Brix |
| **Measurement Accuracy** | Brix : ±0.5% |
| **Repeatability** | Brix : ±0.5% |

The H-100C comes with a demonstration model.
Model performance may vary across variety, temperature, and seasonal change.
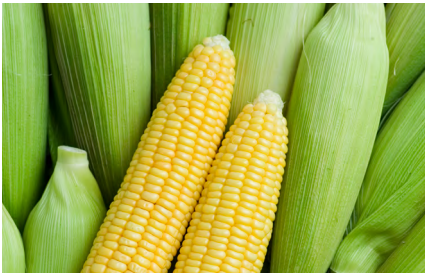
**SUNFOREST H-100C**

# Corn Moisture Meter

## Story

Non-destructively measures moisture level of corn kernel and accurately predicts harvest timing. Moisture content is the key quality indicator in field corn industry. Currently the H-100C is widely used by seed producers in various countries.



## SUNFOREST H-100C : Corn



| | |
|---|---|
| **Object Fruit** | Field Corn, Sweet Corn |
| **Quality Metrics** | Moisture |
| **Measurement Accuracy** | Moisture :  ±4.0% |
| **Repeatability** | Moisture :  ±2.0% |

The H-100C comes with a demonstration model.
Model performance may vary across variety, temperature, and seasonal change.

**SUNFOREST H-100F**

# Apple Brix/DM/Browning Meter

## Story

The H-100F fast and non-destructively measures brix and dry matter of apple, and even detects browning defect. It can help growers to harvest at the most accurate time with quality assessment.

▶ YouTube   www.youtube.com/watch?v=Y2TAoj1xUjw



## SUNFOREST H-100F : Apple



| Object Fruit | Apple |
|---|---|
| Quality Metrics | Brix, Dry Matter, Browning |
| Measurement Accuracy | Brix : ±0.5%<br>Dry Matter : ±0.5% |
| Repeatability | Brix : ±0.5%<br>Dry Matter : ±0.5% |

The H-100F comes with a demonstration model.
Model performance may vary across variety, temperature, and seasonal change.

**SUNFOREST H-100F**

# Peach Brix Meter

## Story

The H-100F fast and non-destructively measures brix of peach.  The Spanish  premium peach brand – Melocoton de Calanda uses H-100F to sort out quality grade of the fruits and guarantees minimum sweetness of 12Brix for their genuine black label.



## SUNFOREST H-100F : Peach



| | |
|---|---|
| **Object Fruit** | Hard and soft type peach |
| **Quality Metrics** | Brix |
| **Measurement Accuracy** | Brix :  ±0.5% |
| **Repeatability** | Brix :  ±0.5% |

The H-100F comes with a demonstration model.
Model performance may vary across variety, temperature, and seasonal change.

SUNFOREST H-100F

# Mango Brix/DM Meter

## Story

As a climacteric fruit. mango can be harvested when fully matured and artificially ripened later through out storage and transportation time. To determine ideal harvest time is a challenge to grower.  The H-100F helps to remove guesswork and accurately redict harvest timing.

## SUNFOREST H-100F : Mango

| Object Fruit | Various mango variety |
|---|---|
| Quality Metrics | Brix, Dry Matter |
| Measurement Accuracy | Brix : ±0.5%<br>Dry Matter : ±0.5% |
| Repeatability | Brix : ±0.5%<br>Dry Matter : ±0.5% |

The H-100F comes with a demonstration model.
Model performance may vary across variety, temperature, and seasonal change.

**SUNFOREST H-100F**

# Pear Brix Meter

## Story

The H-100F fast and non-destructively measures brix of pear.  Shingo produced in Korea is regarded as one of the best taste pear in the world.  H-100F involves quality assessment of Shingo when harvested.



## SUNFOREST H-100F : Pear



| Object Fruit | Shingo and other variety |
|---|---|
| Quality Metrics | Brix, Dry Matter |
| Measurement Accuracy | Brix :  ±0.5%<br>Dry Matter :  ±0.5% |
| Repeatability | Brix :  ±0.5%<br>Dry Matter :  ±0.5% |

The H-100F comes with a demonstration model.
Model performance may vary across variety, temperature, and seasonal change.

**SUNFOREST H-100F**

# Persimmon Brix Meter

## Story

The H-100F fast and non-destructively measures brix of persimmon.  It can help growers to harvest at the most accurate time with quality assessment.



## SUNFOREST H-100F : Persimmon



| | |
|---|---|
| **Object Fruit** | Persimmon (Korean variety) |
| **Quality Metrics** | Brix |
| **Measurement Accuracy** | Brix :  ±0.5% |
| **Repeatability** | Brix :  ±0.5% |

The H-100F comes with a demonstration model.
Model performance may vary across variety, temperature, and seasonal change.

**SUNFOREST H-100F**

# Shine-Muscat Brix Meter

## Story

Non-destructively measures brix level of Shine-muscat grape and accurately predict harvest timing. The H-100F became a must-have management tool for Shine-muscat grower in Korea.



### SUNFOREST H-100F : Grape



| Object Fruit | Shine-muscat, Campbell, Kyoho |
|---|---|
| Quality Metrics | Brix |
| Measurement Accuracy | Brix : ±0.7% |
| Repeatability | Brix : ±0.5% |

The H-100F comes with a demonstration model.
Model performance may vary across variety, temperature, and seasonal change.

**SUNFOREST H-100M**

# Melon/Mini-watermelon Brix Meter

## Story

Non-destructively measures brix level of melon and accurately predict harvest timing.  No more paying for destructive tests to see how your fruit is progressing.  It's been launched on a trial basis in Korea domestica market first, and is now expanding its availability throughout multiple countries where model building test goes on.



### SUNFOREST H-100M : Melon/Mini-watermelon



| | |
|---|---|
| **Object Fruit** | Amarillo, Piel de Sapo, Cantaloupe, Galia, Charentais, Mini-watermelon |
| **Quality Metrics** | Brix |
| **Measurement Accuracy** | Brix : ±1.0% |
| **Repeatability** | Brix : ±0.7% |

The H-100M comes with a demonstration model.
Model performance may vary across variety, temperature, and seasonal change.

# Pocket-Type
# Brix Meter

**SUNFOREST**
## P-100 SERIES
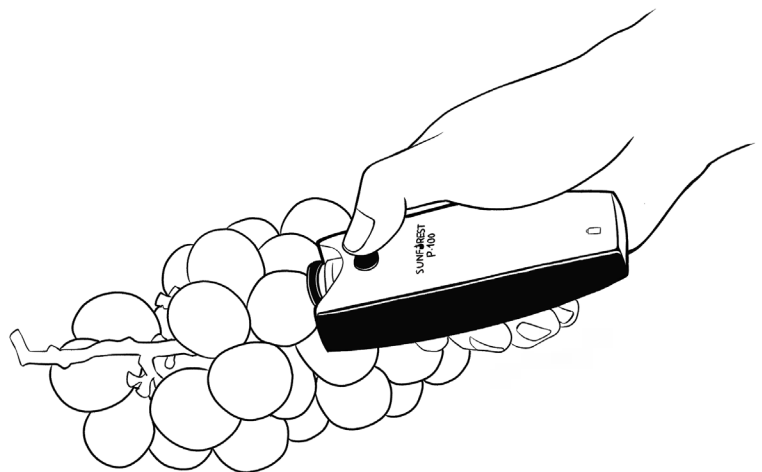
SUNFOREST P-100

# Pocket-Type Brix Meter

## Story

The P-100 brix meter is a pocket-type NIR device specialized for small fruits and can be a useful tool for users from orchard to fresh market. The series range is being expanded further for various commodities.

### SUNFOREST P-100 : Small Fruits



| | |
|---|---|
| **Object Fruit** | Strawberry, Cherry, Blueberry, Cherry-tomato, Grape |
| **Quality Metrics** | Brix |
| **Measurement Accuracy** | Brix : ±1.0% |
| **Repeatability** | Brix : ±0.7% |

The P-100 comes with a demonstration model and an App. Model performance may vary across variety, temperature, and seasonal change.

NIR Spectrometer

# PORTABLE NON-DESTRUCTIVE FRUIT QUALITY METER

SUNFOREST

## H-100 SERIES

Preharvest Ripeness Judgment & Postharvest Quality Inspection



(주)해아림
SUNFOREST

dicsa
Distribuciones Industriales y Científicas S.L.
ciencia e innovación