

# Gain deeper insights into crop health

Know the status of your crop at any time of the day using Folium multi-sensors

## Manage crop health with Folium 6-in-1 multi-sensors

Under pressure to deliver higher yields and better quality produce, growers need more information to determine crop status than ever before. Folium multi-sensors provide this deeper understanding of crop health by recording numerous aspects of climate and environment in realtime.

### More readings provide greater clarity

Folium multi-sensors provide a richer picture of plant health. Each unit collects temperature, relative humidity, CO2, PAR, RAD and barometric pressure readings (with the option to add external plant temperature or soil/substrate moisture sensors). This richer data provides greater clarity on the status of your crop and your growing environment at any point in the day.

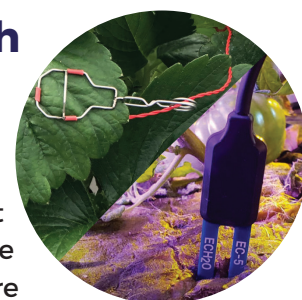


### Address emerging issues with alert notifications

Use powerful alert notifications (triggered by any data collected by Folium) to keep ahead of problems in your growing environment. Be notified when climate variables fall outside your specified parameters so you can act fast to remedy the issues.

### Enhance crop health visibility with external sensors

Folium accepts an external plant temperature sensor or a moisture sensor. Using a plant temperature sensor provides actual (instead of estimated) vapor pressure deficit (VPD) readings to indicate levels of plant stress. Growers can also utilize a moisture sensor to measure the moisture content of the soil/growing substrate. Combining this data provides a detailed picture of plant status in real time.



## Why choose Folium multi-sensors?

Folium multi-sensors are an easy way for you to begin collecting more comprehensive data.

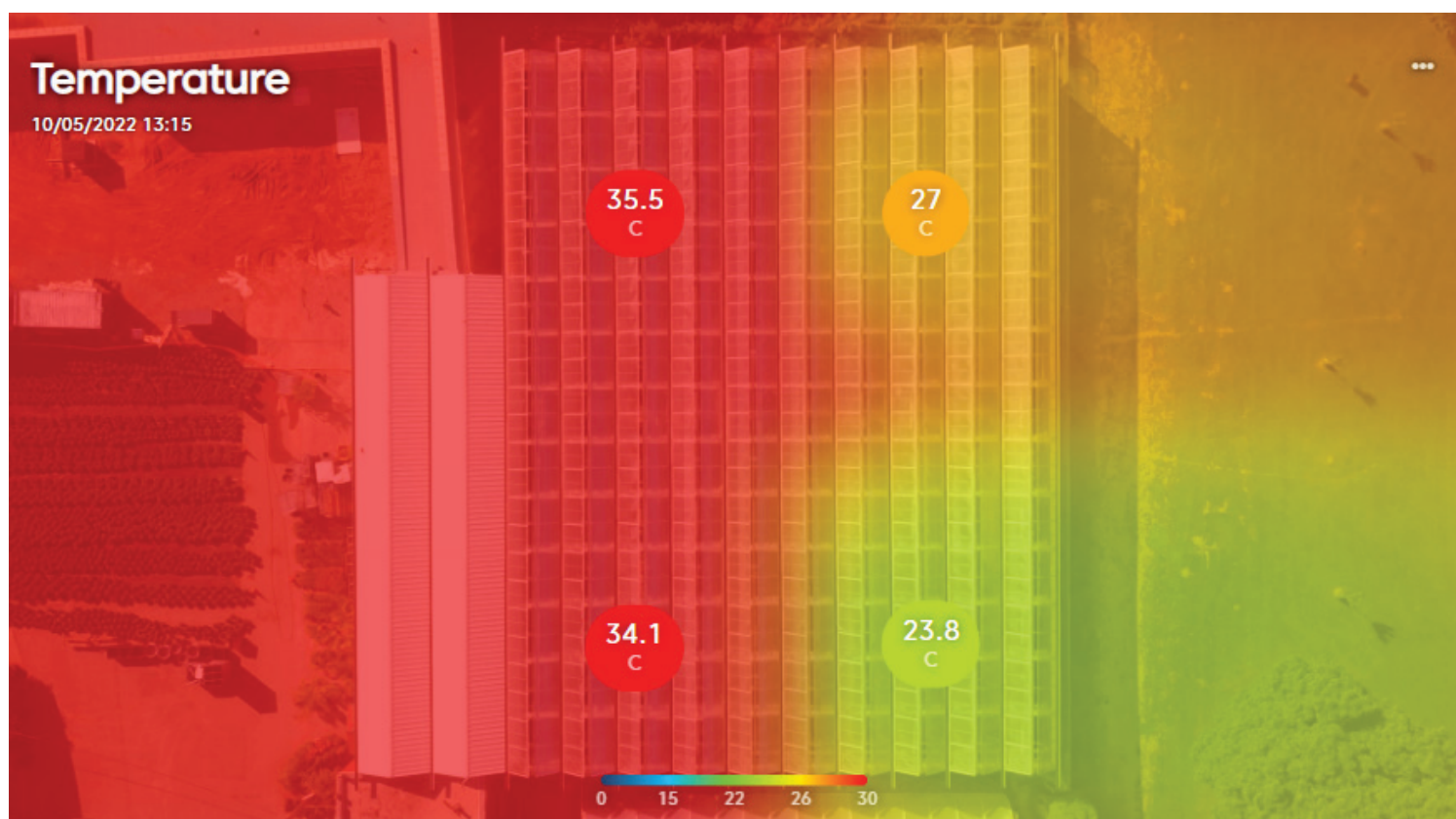
- ✓ Monitor microclimates to pinpoint areas affecting crop production
- ✓ Multiple units can be networked to deliver climate visibility across very large areas
- ✓ Option to include readings from external plant temperature or moisture sensors
- ✓ Use data to validate hunches or potential investment opportunities
- ✓ Portable wireless units get readings from inside the canopy or wherever you need
- ✓ Easy plug and play set-up and install, no electricians required
- ✓ Bluetooth Low Energy technology means Folium's battery lasts up to a year
- ✓ Stores data for up to a week if internet connection is lost
- ✓ Easy to get started and designed to grow as your business grows
- ✓ Affordable at scale

## Folium and the power of FarmRoad

- ✓ Realtime heatmaps reveal uneven climates across growing spaces
- ✓ 24/7 climate alerts via SMS or email
- ✓ History graphs display data from previous days, months, years giving insight into trends
- ✓ CSV Exports to get your sensor data into other systems
- ✓ Remote access via your phone, tablet or desktop computer
- ✓ API Access



Heat map below shows greenhouse temperatures from four Folium sensors.







“What the plant temperature sensor on Folium will enable us to do is to know exactly when to apply whitewash.”

**Guillermo DiGiuseppe,  
Agronomist, Season Farms**

## Use cases

Growers around the world are using Folium in many ways:

- ✔ Measuring the effectiveness of whitewashing on light and heat levels in the greenhouse
- ✔ Ensuring climate levels are optimal for beneficial insects to be effective
- ✔ Avoiding temperature and humidity conditions which could trigger disease outbreaks
- ✔ Pinpointing the root cause of plant variability across growing spaces.

## FAQs

### What crops can I use it for?

Any crop grown under cover e.g. in plastic tunnels, hoop houses or greenhouses. We have farmers using Folium with berries, tomatoes, cucumbers, peppers, herbs and flowers.

### How do I see the data?

Your data is visualized in the FarmRoad platform via your FarmRoad account. Contact us for a demo to see how it works.

### How many Folium units do I need?

WayBeyond's expert agronomists recommend at least 2 Folium units per compartment, or 4 per greenhouse.

Folium is a sensor network therefore the more units you have, the richer your insights become.

### Do units need wiring to a power source?

No. Units are battery powered with 2 standard C-sized batteries. These last up to a year before needing replacements.

The gateway does require a power source and needs to be placed at height with clear line of sight to one of the units. The gateway can also use WiFi so no additional cable required.

### Is there a guarantee/warranty?

Folium is backed by an industry leading 30 day money back guarantee and a 3 year warranty.

### How do I get started?

Contact our agtech specialists to discuss your specific needs and how Folium can work for you.

# Enhance crop health visibility with additional plant temperature or substrate moisture sensors

- ✔ Plant temperature sensor (clips to plant and into base of Folium unit)
- ✔ Soil/substrate moisture sensor (placed in growing media and plugs in to base of unit)

## Why use a plant temperature sensor?

Adding a plant temperature sensor to your Folium setup gives you visibility over current plant stress levels. Placed directly on the stem or leaf, the sensor provides true plant temperature and actual (not estimated) Vapour Pressure Deficit (VPD) readings.

Growers have found that in some cases the difference between air temperature and plant temperature can be as much as 7 degrees Celsius (12.6F). This variance underlines the importance of knowing the exact temperature of your plant rather than estimating it using air temperature. When you're trying to determine how much plant stress is too much, the plant temperature sensor gives you far greater insight and control.



## Why use a soil/substrate moisture sensor?

Using real-time data on the remaining moisture in your growing substrate helps better manage irrigation to increase yield and quality. There's no guesswork on which plants are being overwatered and which are in need.

Using the soil/substrate moisture sensor, watering schedules can be adjusted accordingly so you use less water and less power running pumps – both of which contribute to your costs.



# Technical specifications

## FOLIUM SENSORS

- Six sensor readings per unit – temperature, CO<sub>2</sub>, relative humidity, PAR, RAD and barometric pressure.
- Additional plug-in sensors available: soil/substrate moisture and plant temperature.
- Heatmaps of all data points
- History of sensor data

### Communication specifications

- Unlimited sensor units per compartment or group
- Bluetooth wireless connectivity
- Mesh network capable
- Bluetooth 250m range through foliage or 1km direct line of sight

### Folium unit specifications

- Battery-powered by 2 C size batteries with an expected life of 1 year (where shipping allows)
- Takes readings every 60 seconds
- Unit operating temperature range -18°C ~ 55°C (0 - 131 Fahrenheit)
- Certifications: CE, FCC, IC

### Folium unit dimensions

- 14.5cm (wide) x 20cm (tall)
- 5.7in (wide) x 7.9in (tall)

### Temperature sensor

- Operating Range: -18°C ~ +55°C (0 - 131 Fahrenheit)
- Accurate to ±0.2°C @ 0-55°C (typ)

### CO<sub>2</sub> sensor

- Operating range 0°C ~ 50°C (64 - 131 Fahrenheit)
- Diffusion Sampling
- Measurement Range: 0-5,000ppm CO<sub>2</sub>
- Accuracy: ±50ppm ±3% of reading

### Barometric pressure sensor

- Operating range: 300-1100 hPa @ -40-85°C
- Accuracy: ±1 hPa @ 0-65°C

### Relative humidity sensor

- Operating range 0 - 100% RH
- Accurate to ±1.5 @ 0-80% RH

### Solar radiation PAR/RAD sensors

- PAR - A spectral range of 400 to 690nm
- RAD - A spectral range of 300 to 1100nm
  - Operating range of 0 to 975W/m<sup>2</sup>

NOTE: Product warranty is limited to indoor use.

**Folium unit model number: HENV-FOL-001-01**





## PLANT TEMPERATURE SENSOR

### Available in two options

- Single clip sensor. This sensor reads plant temperature directly from the clip's location
- 4-clip sensor. This sensor takes the average reading from 4 thermistors placed on different parts of the plant.

### Plant temperature specs

- Measurement Range: 0 to 50°C (32 - 122 Fahrenheit)
- Accuracy:  $\pm 0.08^\circ\text{C}$
- Resolution:  $0.1^\circ\text{C}$
- Thermistor + Leaf Clip Weight: 1.6 grams
- Contact Area of Thermistor:  $\sim 1\text{ mm}^2$
- Cable Length (between thermistor and conditioner): 1m (1-clip)
- Cable Length (between thermistor and conditioner): 0.5m (4-clip)
- Cable Length (between conditioner and data logger): 5m (standard)

1-clip sensor model number: HPRB-FOL-002-01

4-clip sensor model number: HPRB-FOL-002-04



## SOIL/SUBSTRATE MOISTURE SENSOR

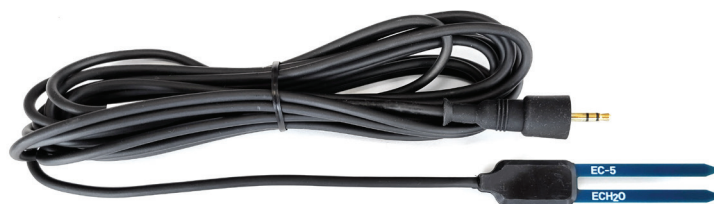
### Pre calibrated for the following substrates

- Cococoir Pelemix
- Coco peat
- Soil
- Rockwool Grodan
- Rockwool Cultilene

### Moisture sensor specs

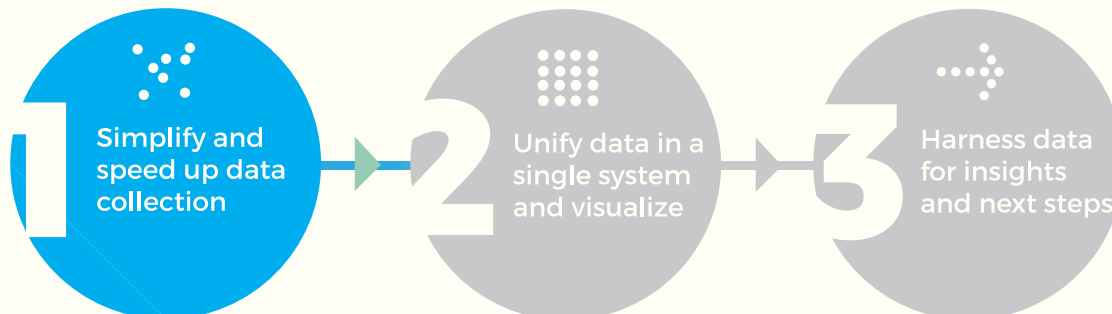
- Range: 0%-100%
- Resolution: 0.001 m<sup>3</sup>/m<sup>3</sup> VWC in mineral soils, 0.25% in growing media
- Accuracy: Generic calibration:  $\pm 0.03\text{ m}^3/\text{m}^3$  typical in mineral soils that have solution EC  $< 8\text{ dS/m}$
- Medium specific calibration:  $\pm 0.02\text{ m}^3/\text{m}^3$  in any porous medium ( $\pm 2\%$ )
- Rockwool: Range: 20 - 90%, Accuracy (mean absolute percentage error, MAPE):  $\pm 10\%$

Moisture sensor model number: HPRB-FOL-001-01



# Digital transformation in 3 steps

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## Get in touch to get started today!

For more information on our solutions visit [www.waybeyond.io](http://www.waybeyond.io) or contact the team for a demo [info@waybeyond.io](mailto:info@waybeyond.io)



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