KEY FEATURES

Battery Life: Up to 1 year, depending on interval

Splash resistant and wire free design for placement anywhere within cultivation area

CO2 measurements are temperature, humidity, and pressure compensated

Out of box operation with GrowFlux apps & dashboard; access to data through API (requires subscription)

CO2 Detector:

Range: 0-10,000 PPM

Accuracy: ± 60 PPM

Detection technique: non-dispersive infrared (NDIR)

Response time: 5 minutes

Calibration: factory calibrated; supports outdoor calibration without specialized equipment

Humidity Sensor:

Range: 0-95%

Accuracy: ± 3% 10-90% RH

Drift: < 0.5% RH / year

Detection technique: capacitive

Calibration: factory calibrated

Temperature Sensor:

Range: -40 to 60°C (-40 to 140°F)

Accuracy: ± 0.5°C

Pressure Sensor:

Range: 30-110 kPa

Accuracy: ± 0.012 kPa at 70 - 110 kPa, 25-40 °C.

REQUIRES GROWFLUX ACCESS POINT, SOLD SEPARATELY

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The GrowFlux CO2 Microclimate Sensor is part of a high performance monitoring system for horticultural applications and measures the following environmental conditions:

(CARBON DIOXIDE) (ATMOSPHERIC PRESSURE)
(RELATIVE HUMIDITY) (TEMPERATURE)

Featuring a splash resistant housing, long battery life, and high performance wireless connectivity, the GrowFlux CO2 Microclimate Sensor is designed to be placed anywhere within a controlled environment to generate high resolution microclimate data.

The GrowFlux CO2 Microclimate Sensor is part of the GrowFlux ecosystem, and data generated by the sensor is immediately available on the GrowFlux Control Panel, in the GrowFlux App, and through the GrowFlux API.

Three ways to access & integrate sensor data:

1. Download the GrowFlux App for iOS & Android

2. Access the GrowFlux Control Panel at https://panel.growflux.com

3. Integrate sensor data with other systems and applications with the GrowFlux API

Specifications subject to change.
See growflux.com/co2 for updates
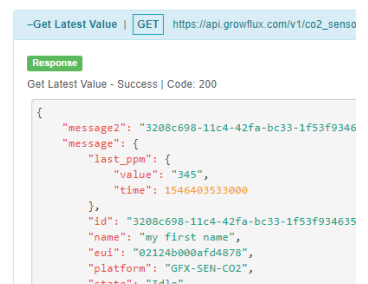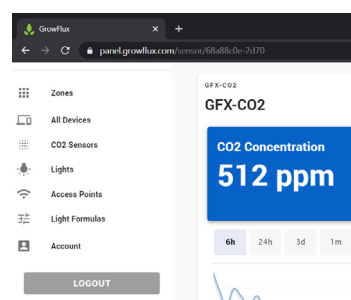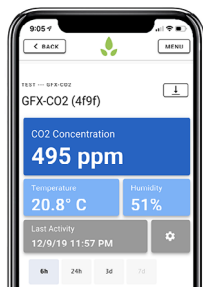
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Basic Monitoring

Included with sensor at no additional cost

- Control & logging through the GrowFlux App for iOS and Android and browser based interface
- Real time monitoring of CO2, temperature, and humidity
- Up to 3 days datalogging
- App & browser based data visualization
- 15 minute sensor data interval
- Unlimited software defined zoning
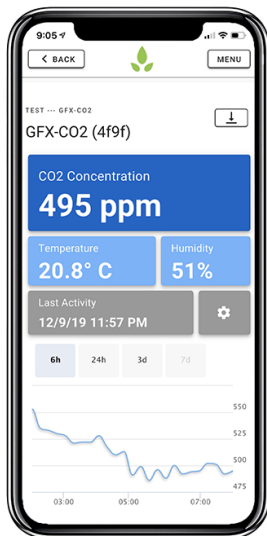
Pro Monitoring

Subscription license required

All basic features plus:
- User defined sensor data interval, 1 to 120 minutes
- Alerts & notifications
- CSV data download
- 1 year datalogging
- Software API Access
- Priority support

For subscription details and pricing, see growflux.com/co2

A user experience built for horticulture

With the GrowFlux App for iOS and Android, a browser based dashboard, and our secure API, GrowFlux's controls are designed for horticulture and take the labor out of microclimate monitoring.

Download on the App Store

GET IT ON Google Play

```
9:05
< BACK            MENU
TEST --- GFX-CO2
GFX-CO2 (4f9f)

CO2 Concentration
495 ppm

Temperature        Humidity
20.8° C            51%

Last Activity
12/9/19 11:57 PM

6h    24h    3d    7d

                        550
                        525
                        500
                        475
03:00   05:00   07:00
```
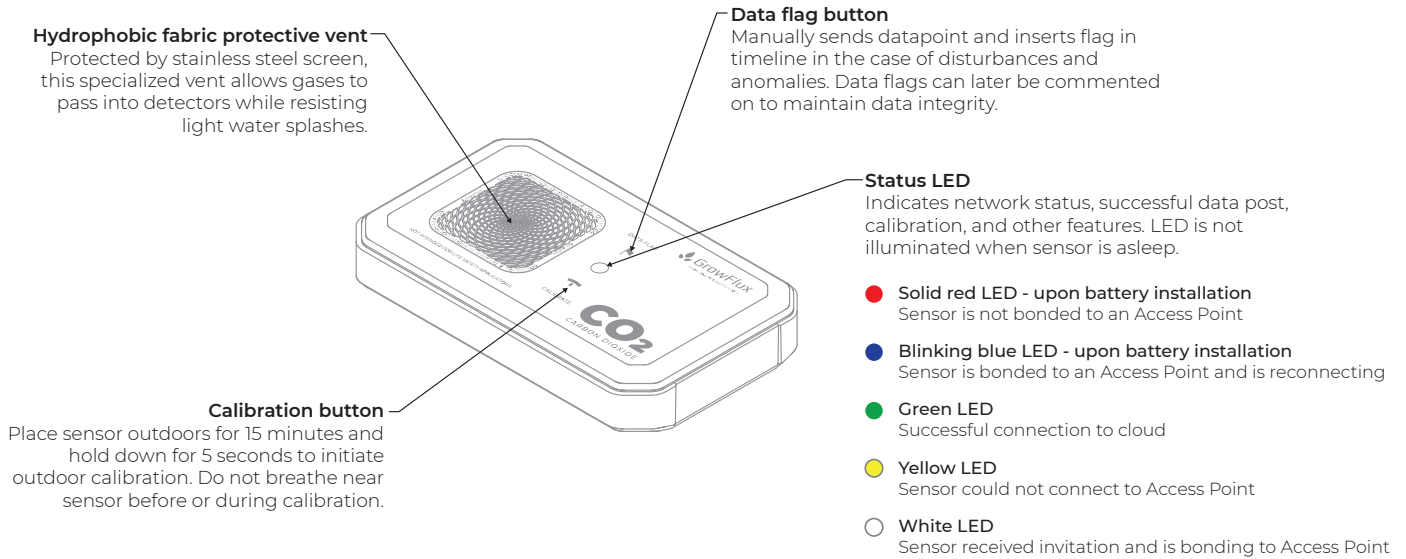
Cloud based datalogging

Never lose data again due to clumsy memory cards, flash drives, and USB data downloads. Cloud based data logging with GrowFlux's Pro Monitoring plans ensure the right data is collected consistently while eliminating the labor associated with monitoring practices. Access your data from anywhere and spend more time taking action.

ZONE C14   ZONE D14   ZONE E14   ZONE F14
5   ZONE D15   ZONE E15   ZONE F1
ZONE D16   ZONE E16   Z

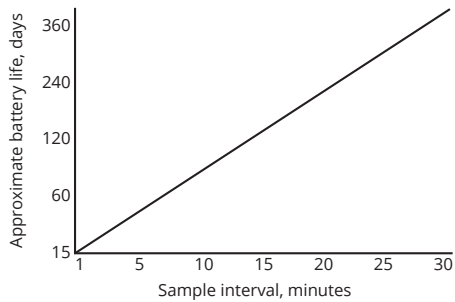## Unlimited Software Defined Zoning

Farms of any size and number of devices are easy to manage with GrowFlux controls. Users can create an unlimited number of software based zones containing lights and sensors with our intuitive interface, based on your business needs and cultivation schedule.

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Specifications subject to change.
See growflux.com/co2 for updates

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Hydrophobic fabric protective vent
Protected by stainless steel screen, this specialized vent allows gases to pass into detectors while resisting light water splashes.

Data flag button
Manually sends datapoint and inserts flag in timeline in the case of disturbances and anomalies. Data flags can later be commented on to maintain data integrity.

Status LED
Indicates network status, successful data post, calibration, and other features. LED is not illuminated when sensor is asleep.

● **Solid red LED - upon battery installation**
Sensor is not bonded to an Access Point

● **Blinking blue LED - upon battery installation**
Sensor is bonded to an Access Point and is reconnecting

● **Green LED**
Successful connection to cloud

● **Yellow LED**
Sensor could not connect to Access Point

○ **White LED**
Sensor received invitation and is bonding to Access Point

Calibration button
Place sensor outdoors for 15 minutes and hold down for 5 seconds to initiate outdoor calibration. Do not breathe near sensor before or during calibration.

Battery life vs. sample interval

(Graph: Approximate battery life, days vs. Sample interval, minutes. Y-axis: 15, 60, 120, 240, 360. X-axis: 1, 5, 10, 15, 20, 25, 30)

Note on battery life:

CO2 measurements have a significant impact on battery performance, while.....

Battery life can be affected by high or low ambient temperature.

Estimates shown are associated with Energizer® Ultimate Lithium™ L91 AA size batteries.

GrowFlux recommends Energizer® Ultimate Lithium™ L91 batteries; otherwise alkaline batteries with a nominal cell voltage of 1.5V may be used with some degradation to battery performance.

Maximum quantity of sensors per Access Point

Sample interval, minutes	Sensor quantity
1	60
5	300
15	900
30	1800
60	3600

Note on quantity of sensors:

GrowFlux generally states up to 300 sensors can be used with one Access Point, however depending on the sample interval, more or less sensors may be associated with an Access Point.

Adding devices such as GrowFlux Mesh compatible lights and dimmers will affect the maximum number of devices per Access Point.

An unlimited number of Access Points may be added to an account to support facilities of any size.

Approximate sensor coverage

Average air velocity	Sensor coverage, low resolution
0 - 0.25 m/s (0 - 0.8 ft/s)	23 sq m (250 sq ft)
0.25 - 0.5 m/s (0.8 - 1.6 ft/s)	56 sq m (600 sq ft)
0.5 - 1.0 m/s (1.6 - 3.3 ft/s)	111 sq m (1200 sq ft)
1.0 - 2.0 m/s (3.3 - 6.6 ft/s)	186 sq m (2000 sq ft)
2.0 + m/s (6.6 + ft/s)	232 sq m (2500 sq ft)

Note on sensor coverage:

Coverage suggestions assume air mixing at point of supplementation (fans, air handlers, etc). Placing sensors near people, animals, or point sources of CO2 enrichment will cause higher than ambient readings.

High aspect ratio cultivation spaces, such as long greenhouses, may require higher sensor density.

Carbon dioxide is heavier than air and sinks; additional sensors are required for multi tier cultivation and vertical farming applications.

Precautions

Life Safety	The GrowFlux CO$_2$ Microclimate Sensor is not intended for life safety applications! The GrowFlux CO$_2$ Microclimate Sensor is not suitable to comply with local safety regulations or to monitor personal exposure.
	Exposure to carbon dioxide rich environments can cause death. Purchaser is responsible for implementing safety equipment, including but not limited to carbon dioxide alarms, shut off valves, personal monitors, and/or monitoring and safety equipment required per local regulations. The purchaser shall indemnify GrowFlux from all claims arising from any product use not covered by the parameters of this product data sheet or not approved by GrowFlux.
Vibration	High vibration and continuous vibration may affect accuracy of sensor. Do not mount on vibrating equipment.
Shock & impact	Drops and impact may cause minor mis-alignment within sensitive optical detectors. Sensor may require outdoor calibration after being subject to drops and impact. Outdoor calibration is recommended but not required after shipping sensor.
Ingress protection & water	Sensor is designed for use in wet environments, including humid environments and light splashing. The stainless steel screen on the sensor covers a hydrophobic fabric to protect sensing elements from light splashing. The sensor shall not be subject to water sprays of any pressure level. Do not submerge sensor in liquid. Water ingress due to excessive liquid exposure may void warranty. Clean sensor only with a damp cloth.
Chemical exposure	Exposing sensor to chemicals, such as organic solvents, alcohol, fuel, bleach, ammonia, alkaline agents, silanes, ozone, and the like will damage sensing elements and hydrophobic properties of the protective fabric.
Sunlight & light exposure	As with all digital humidity sensors, high intensity light may interfere with the accuracy of humidity measurements. The GrowFlux CO$_2$ Microclimate Sensor is designed to shield sensing elements from high intensity light, however GrowFlux recommends placing sensor in shade for optimal humidity sensor accuracy.
	Sensors placed in direct sunlight or under high intensity artificial light, including LED light, will exhibit heat gain and affect temperature readings. GrowFlux advises placing the sensor away from direct exposure to sunlight and high intensity lights if accurate temperature readings are necessary.
Batteries	GrowFlux recommends using AA size Energizer® Ultimate Lithium™ L91 batteries for optimal battery life, which ship pre-installed with sensor. Software user interface features such as battery life indication is based on Energizer® Ultimate Lithium™ L91 performance characteristics; using a different type of battery will cause these features to indicate inaccurate battery statistics.
	Alkaline AA size batteries may be used with the GrowFlux CO$_2$ Microclimate Sensor, however battery life may vary significantly from estimates provided in this product datasheet.
	Use only new batteries. Never use old batteries. Never mix battery types or brands.
	AA size Energizer® Ultimate Lithium™ L91 and AA size alkaline batteries with a nominal cell voltage of 1.5V are the only batteries suitable for use with the GrowFlux CO$_2$ Microclimate Sensor. Use of any other type of battery may void warranty and damage device. Use of batteries with a nominal cell voltage greater than 1.5V will destroy internal circuitry and void warranty.

Energizer® and Ultimate Lithium™ are trademarks of Energizer Holdings, Inc.

General Specifications

Dimensions:	146 mm x 88 mm x 25.6 mm (5.75 in x 3.46 in x 1.01 in)
Weight:	250g (8.8 oz)
Ingress protection:	resistant to dust ingress and splashing of liquid water
Operating temperature range:	0 to 50°C (32 to 122°F) for ± 60 PPM CO₂ readings; full range is -40 to 60°C (-40 to 140°F)

Note:
1. High and low temperature operation may affect battery life

CO₂ Sensor Specifications

Sensing range:	0 - 10,000 PPM
Accuracy:	± 60 PPM @ 1000 PPM
Detection technique:	Non-dispersive Infrared (NDIR) detector measures optical absorption of CO₂ in NIR spectrum
Operating temperature range:	Accuracy is valid for 0 to 50°C (32 to 122°F); ± 2.5 PPM / °C stability
Ambient response time:	Approximately 5 minutes; response time may vary (see note)
Recommended sensing interval:	Once every 5 - 15 minutes for most CO₂ enrichment applications
Calibration:	Calibration is recommended once per year. Dropping or impacting sensor may affect accuracy, and calibration is recommended after subjecting sensor to impact. To calibrate sensor, move sensor outside for 15 minutes and hold down calibration button for 5 seconds (see note)

Note:
1. Airflow around sensor affects response time. Exposure to very high CO₂ concentrations > 3,000 PPM may increase response time.
2. Breathing from nearby people and animals will significantly affect readings. Press the blue flag button to insert a data flag in the timeline when working around sensors - data flags can later be commented on to maintain integrity of datasets.
3. Do not breathe near sensor while adjusting device to outdoor ambient levels during outdoor calibration. Hold breath when approaching sensor to hold down button for 5 seconds.

Relative Humidity & Temperature Sensor Specifications

Humidity detection range:	0-95%
Humidity accuracy:	± 3% 10-90% RH
Humidity drift:	< 0.5% RH / year
Temperature accuracy:	± 0.5°C (see note)
Temperature range:	-40 to 60°C (-40 to 140°F); High and low temperature operation may affect battery life
Calibration:	Internal relative humidity and temperature sensors are factory calibrated

Note:
1. While the internal temperature sensor exhibits high absolute accuracy, the placement of the sensor inside the housing does not result in fast response times. If rapid response, high accuracy air temperature measurements are required, please contact GrowFlux for an appropriate sensor.

Atmospheric Pressure Sensor Specifications

Pressure detection range:	30 - 110 kPa
Pressure accuracy:	± 0.012 kPa at 70 - 110 kPa, 25-40 °C.
Pressure drift:	± 0.1 kPa / year
Calibration:	Internal pressure sensor is factory calibrated

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Wireless Specifications

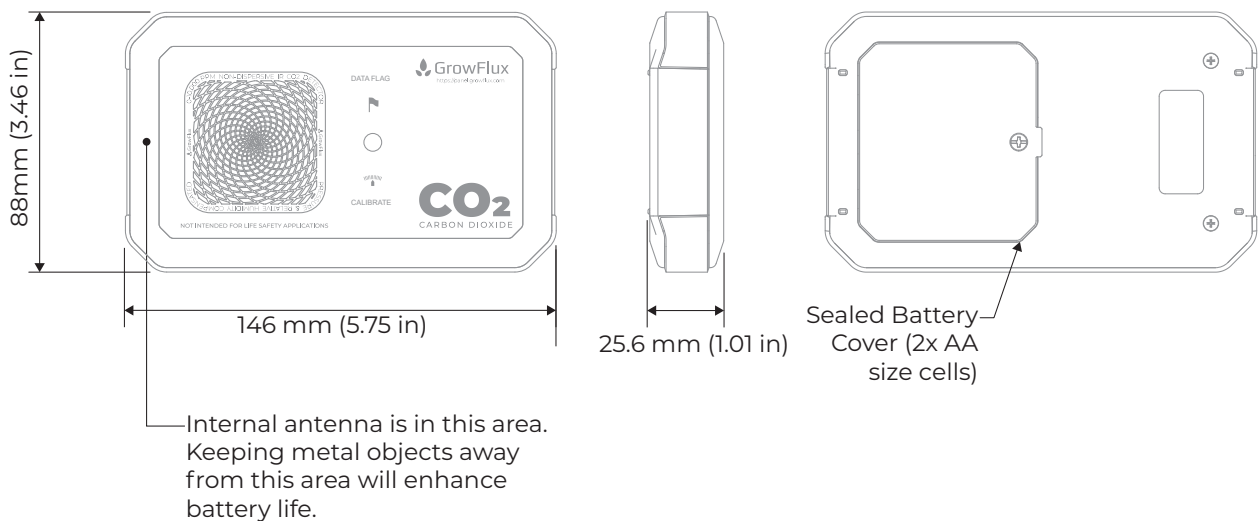|	
Wireless protocol:	GrowFlux Mesh - REQUIRES GROWFLUX ACCESS POINT
Security:	RF data is AES128 encrypted; application layer is TLS encrypted. No inbound connections
Wireless frequency:	902-928MHz (US & Canada Market)
Wireless range:	500 feet line of sight, 300 feet indoors through walls typical range in commercial buildings. Range is not guaranteed and is highly dependent on building construction and electromagnetic / RF noise present in the local environment
Meshing:	Meshes to nearest always on devices - smart range extension works with nearby devices which are not battery powered (lights, dimmers, repeaters, etc). Self healing mesh automatically re-routes messages based on wireless signal strength
Channels:	50 channels; automatic channel hopping
Radio power:	Automatically adjusted for optimal battery life; up to +12dBm
Antenna:	2.0dB high gain internal antenna

Note:
1. Placing sensor closer to nearby devices (non-battery powered), such as lights, Access Points, and repeaters extends battery life
2. Mount sensor to non-metallic surface and keep metal objects away from sensor for optimal wireless range and battery life

Battery Details

Battery types:	Cylindrical Primary Lithium (Li/FeS$_2$); alkaline Zinc-Manganese Dioxide (Zn/MnO$_2$)
Recommended models:	Energizer® Ultimate Lithium™ L91 AA size
Low battery behavior:	Approximate battery capacity shown in interface; battery life estimate based on lithium chemistry
Absolute maximum battery voltage:	1.825 V per cell. Use of batteries of a higher cell voltage will damage device and void warranty.

Note:
1. Sensor is optimized for Li/FeS2 cells. Use of alkaline batteries may indicate inaccurate battery capacity and results in shorter life.
2. Only use new batteries. Do not mix used with new batteries. Do not mix brands or batches of batteries.
2. Shorter data interval settings results in shorter battery life.

88mm (3.46 in)

146 mm (5.75 in)

25.6 mm (1.01 in)

Sealed Battery Cover (2x AA size cells)

Internal antenna is in this area. Keeping metal objects away from this area will enhance battery life.

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Specifications subject to change.
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ORDERING INFORMATION

Typical Part Number

GFX - CO$_2$ - 10K - B - NA

1   **2**   **3**   **4**

1 - Series Name

CO$_2$ - CO$_2$ Microclimate Sensor

2 - Range

10K - 0 to 10,000 PPM

3 - Power Option

B - Battery powered

4 - Region

NA - North America, 900 MHz wireless

EU - Europe, 868 MHz wireless

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