

FEATURES AT A GLANCE

Efficiency: 2.35+ $\mu\text{mol/watt}$

90%, 50,000 hour output guarantee

5 year limited warranty

MET Listed to UL1598

Rated for wet locations; fully waterproof & sanitizable

Available with Precision PAR™, the industry's only PAR management solution which delivers consistent output over time

Made in USA

Available with two tunable spectrum models:

GH: Greenhouse tunable broad spectrum emphasizing supplemental wavelengths

IN: Indoor vegetative & flowering emphasizing white as well as supplemental wavelengths for indoor cultivation

Typical 50%+ facility wide energy savings over HPS lighting

Industrial reliability AetherMesh wireless control included standard

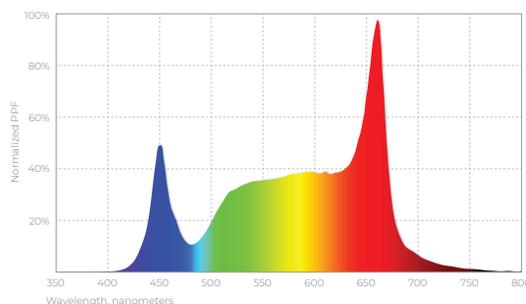
Seamless integration with energy saving and yield boosting GrowFlux sensors, including Vapor Pressure Deficit (VPD), CO₂, and PAR light sensors



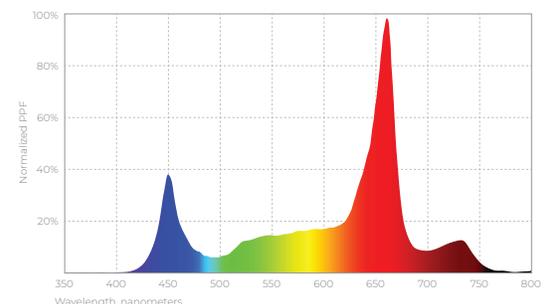
FluxScale™ Top Light is a connected, fully tunable broad spectrum horticultural lighting product designed for greenhouses and high intensity top lighting applications. Featuring our patent pending Precision PAR™ technology, FluxScale™ Top Light is the only horticultural lighting solution on the market capable of delivering consistent PAR for up to 10 years, with an extended warranty and output guarantee to match.

FluxScale™ Top Light is also the industry's first LED fixture with an extended tunable range, offering unmatched control and efficiency for indoor cultivation, seed production, and greenhouse cultivation. By achieving an industry leading 2.35+ $\mu\text{mol/watt}$ energy efficiency, FluxScale™ Top Light reduces facility energy consumption typically by 50% or more compared to conventional horticultural lighting systems.

FluxScale™ Top Light is available with two standard installed spectrum options: VF for tunable broad flowering & vegetative growth designed for sole source applications and GH for supplemental greenhouse lighting.



Typical flowering spectrum, IN option
2.1 $\mu\text{mol/W}$



Typical supplemental spectrum, GH option
2.35 $\mu\text{mol/W}$

TUNABILITY FOR YOUR BOTTOM LINE

GrowFlux designs tunable LED lighting for tailored outcomes to drive your bottom line. From reducing time to harvest, manipulating flavor and phytochemicals, controlling plant morphology, and optimizing flowering, GrowFlux Light Formulas are developed by GrowFlux’s horticulture experts and research partners to drive profitability and reduce operating cost.

Light Formulas for specific crops and outcomes are included with the GrowFlux control suite for no additional charge. The GrowFlux Control Panel also allows for unlimited tunability and zoning, allowing your business to develop proprietary Light Formulas for your specific needs and cultivars. Finally, leading horticultural research institutions use GrowFlux lighting - many of the latest developments in horticulture research can be re-created with GrowFlux tunable lighting.

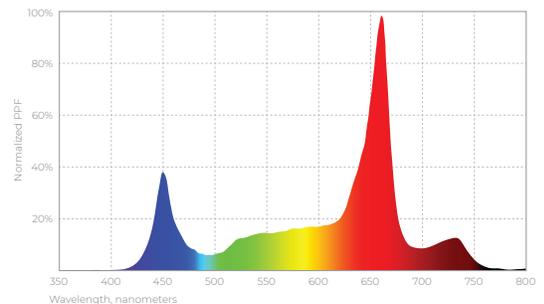
Installed LEDs

-GH Installed Spectrum Option

Greenhouse tunable spectrum emphasizing supplemental wavelengths

Channel	LEDs	Installed Power (Watts DC)	Installed PPF (µmol)
660nm Deep Red	Luminus SST-20-DR	360 W	902 µmol
450nm Royal Blue	Luminus SST-20-B	182 W	419 µmol
5000K 80CRI White	Luminus MP5050 8100	152 W	303 µmol
730nm Far Red	Luminus SST-10-FR	106 W	155 µmol
TOTAL		801 W	

Note: only 585W is addressable at once



Typical supplemental spectrum, GH option
2.35 µmol/W

Note: Efficiency varies with spectrum setting

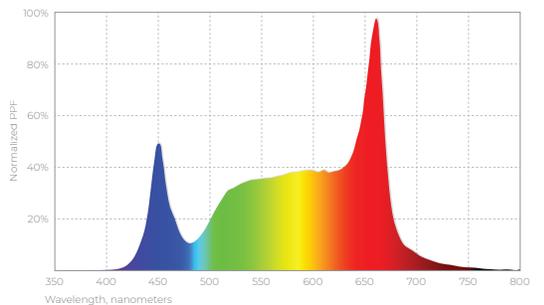
-IN Installed Spectrum Option

Vegetative Flowering tunable spectrum emphasizing white supplemental light

Channel	LEDs	Installed Power (Watts DC)	Installed PPF (µmol)
3000K 80CRI White	Luminus MP5050 8100	308 W	670 µmol
5000K 80CRI White	Luminus MP5050 8100	154 W	325 µmol
660nm Deep Red	Luminus SST-20-DR	172 W	430 µmol
450nm Royal Blue	Luminus SST-20-B	182 W	419 µmol
730nm Far Red	Luminus SST-10-FR	71 W	170 µmol
TOTAL		860 W	

Note: only 585W is addressable at once

Note: FluxScale 600TL with -IN spectrum is the only lighting product in the industry capable of delivering both vegetative and flowering spectrum at full power



Typical flowering spectrum, IN option
2.1 µmol/W

Note: Efficiency varies with spectrum setting

CONTROL

GrowFlux is the industry leader in horticultural lighting control. FluxScale Top Light offers control capabilities through the GrowFlux Control Panel, the GrowFlux App for iOS and Android, sensor based lighting control, and control integration with third party providers such as Argus, Priva, Link4, and others via the GrowFlux API.



Wireless control comes standard on all fixtures

FluxScale Top Light automatically associates to the GrowFlux Access Point out of the box, requiring no individual configuration for individual fixtures which significantly increases installation speed for large lighting systems.

High reliability wireless connectivity

All GrowFlux products are wirelessly networked with our industrial reliability AetherMesh technology, ensuring reliable communication across networks of thousands of lights and sensors. AetherMesh devices typically achieve 500+ feet indoor range through walls and floors and 1+ mile range with line of sight.

Industrial security

All wireless communications are AES128 encrypted; Application layer communication between FluxScale Top Light and GrowFlux controls is TLS encrypted. All GrowFlux control interfaces, including the GrowFlux Control Panel, GrowFlux API, and GrowFlux App for iOS and Android are SSL encrypted and secured with multi factor authentication or an API key. Additionally, GrowFlux puts considerable effort into designing around potential security holes at all layers of the hardware and networking stack.



GrowFlux Control Panel

The GrowFlux Control Panel is the full featured user interface for all GrowFlux products and is accessible by browser or Chrome extension. The Control Panel allows users to select from our library of Light Formulas, develop their own spectrum & schedules, manage zones of fixtures, and view critical infrastructure information such as facility energy consumption and equipment status.

GrowFlux App for iOS & Android

Control and monitor GrowFlux products anywhere in your facility with the GrowFlux App - most features



from the browser based Control Panel are available through the App.

GrowFlux API

GrowFlux products work with third party controls through the GrowFlux API, a secure, RESTful software API which integrates with any control system such as Argus, Priva, Link4, Autogrow, and others.

Precision PAR™ - *The industry's only PAR management solution*

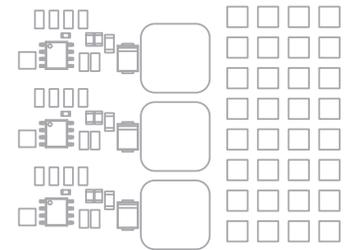
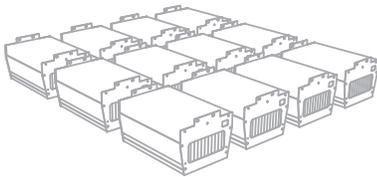
Precision PAR™ works behind the scenes with FluxScale LED fixtures to calibrate lighting based on electrical and thermal measurements collected from fixtures as well as operating history metrics. Precision PAR delivers consistent light levels over time, resulting in repeatable yields batch to batch.

Conventional LED fixtures can degrade in output by as much as 10-15% in the first 2-3 years of operation. Without data on operating history and LED operating temperature over time, lighting control systems cannot accurately offset degradation over time. Only GrowFlux patent pending Precision PAR technology gathers data from fixtures continuously, ensuring accurate calibration and consistent PAR levels.

Precision PAR is available with FluxScale series fixtures for a small subscription fee priced on a per-facility basis, and **Precision PAR extends the 5 year Limited Warranty by up to 10 years.**



How Precision PAR™ Works



1. Each FluxScale fixture continuously sends over 20 performance datapoints such as engine temperature and electrical measurements

2. The GrowFlux Cloud Platform records operating settings and performance data for each fixture. Machine learning algorithms are used to compute unique calibrations for each fixture

3. Calibrations are sent to each individual fixture in the field. Precise drive electronics efficiently deliver the correct amount of power to LEDs

SENSOR INTEGRATION

FluxScale Top Light works with GrowFlux sensors for easy lighting control based on real time conditions. Incorporating sensors into lighting controls offers growers significant opportunities to save energy and enhance yields. Only GrowFlux offers an ecosystem of horticultural lights and wireless sensors in the same platform, making advanced sensor control of lighting accessible to any grower.



Vapor Pressure Deficit (VPD)

VPD is a measure of the amount of additional moisture the air in the plant canopy can absorb at current conditions, and is directly related to the amount of water the crop is transpiring via stomata. As stomata close in response to low VPD, photosynthesis decreases,

GrowFlux VPD sensor control allows lighting to respond to plant transpiration, reducing energy consumption during times plants are not fully photosynthesizing light.

VPD is measured by placing GrowFlux waterproof digital humidity sensors in the plant canopy and our non-contact infrared canopy temperature sensor above the crop. Automatic VPD sensor control is then directly configurable for an entire zone of lights in the GrowFlux Control Panel.



Photosynthetic Active Radiation (PAR)

PAR is measured with GrowFlux's PARspec PPF + spectrum sensor, which allows growers to accurately quantify Daily Light Interval (DLI), real time spectrum, and par intensity (PPFD).

PARspec measurements are available in the GrowFlux Control Panel and can be associated with multiple zones of fixtures for DLI control in greenhouse environments.

Sensor based DLI control allows growers to save a significant amount of energy while accurately meeting the crop's DLI needs.

PARspec is also useful for applications where growers need to understand intracanopy PAR and PAR at canopy level in indoor cultivation environments.



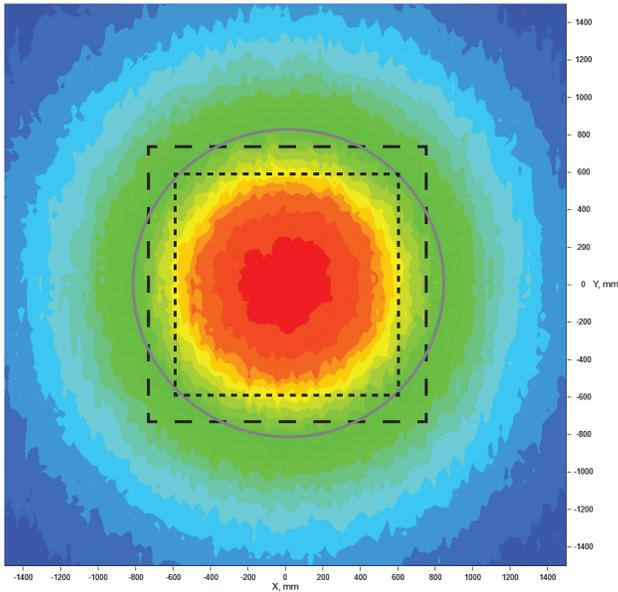
Carbon Dioxide (CO2)

CO2 enrichment can dramatically increase photosynthetic efficiency in growing environments and is recommended for vigorous growth.

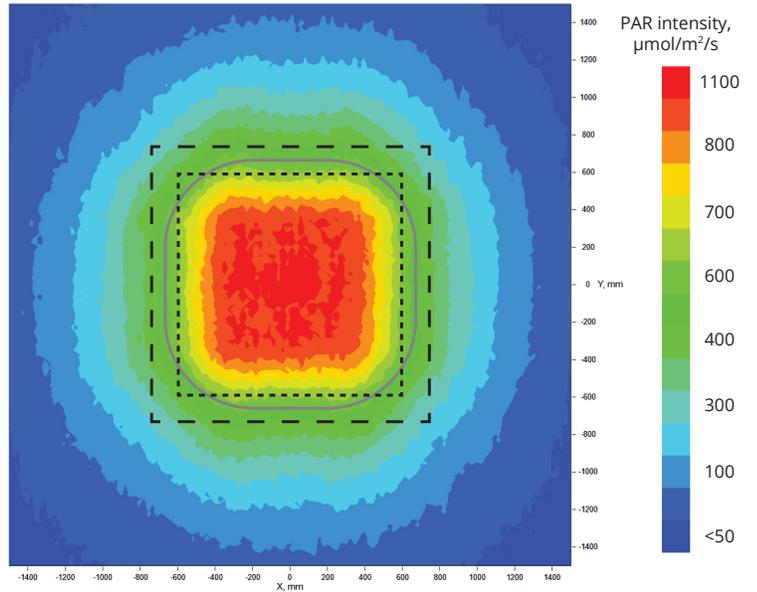
GrowFlux CO2 sensors are tightly integrated with the FluxScale Top Light to ensure that every mole of light is accounted for. Electric light is delivered only when plants can use it most efficiently.

Through efficient management of supplemental lighting and CO2 concentration, growers can increase throughput and improve their bottom line.

GrowFlux offers the industry's only waterproof, battery powered, and wireless CO2 sensor with battery life upwards of 1 year.

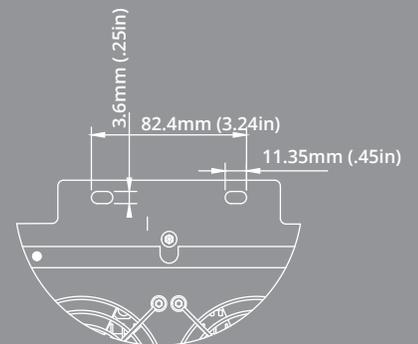
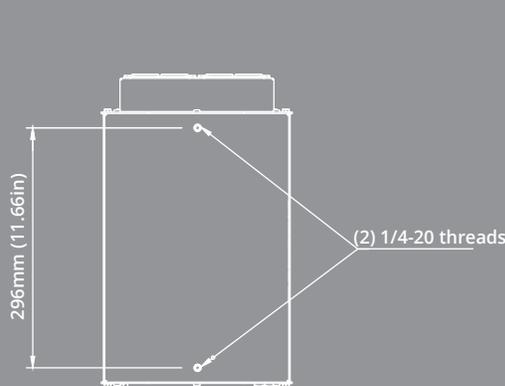
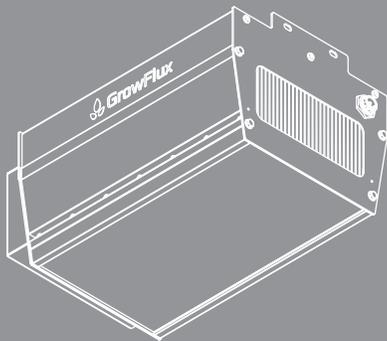
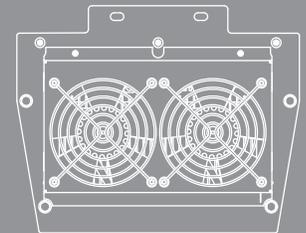
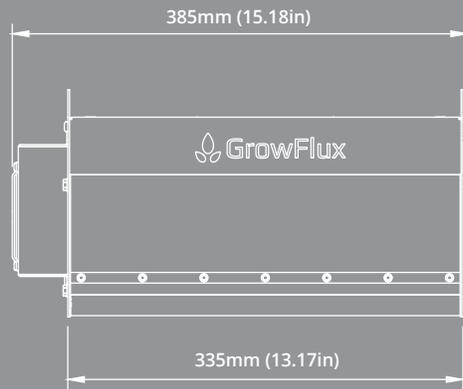
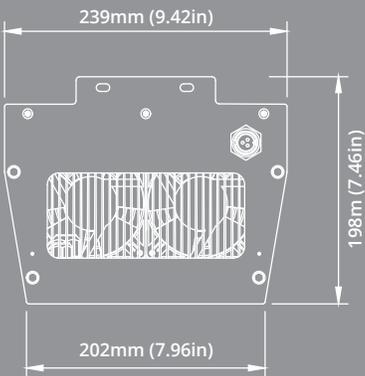


Intensity distribution at 3.3ft height
FluxScale 600TL without reflector
130° distribution



Intensity distribution at 3.3ft height
FluxScale 600TL with accessory reflector
120° distribution

- 4ft (1.2m) square canopy area
- - - - - 5ft (1.5m) square canopy area
- 50% Intensity boundary



Detailed Specifications

Lighting Specifications	
LED emitters	Ceramic 3535 single color LEDs & 5050 multi-die white LEDs (see installed spectrum options)
LED bands	Five (3000K 80CRI white, 5000K 80 CRI white, 450nm blue, 660nm red, 730nm far red)
Tunability resolution	255 levels for each of four bands, with over one billion possible spectrum combinations
Max PPF flowering spectrum (-VF option)	1340 umol / second @ 610 watts AC power consumption
Max PPF vegetative spectrum (-VF option)	1200 umol / second @ 610 watts AC power consumption
Cooling	Cooling via two intelligent IP68K dual bearing fans. Fan speed is monitored and adjusted continuously for optimal thermal management. Fan obstruction will result in reduced output power and automatic push notifications to the GrowFlux mobile app
Optics	Internal high efficiency reflector maximizes PAR extraction; light engines are sealed with low iron, anti reflective, fingerprint resistant tempered glass transmitting 98% of PAR from LEDs
Optional Optics	External reflectors can be installed on FluxScale 600 to diffuse, spread, or concentrate PAR. Contact GrowFlux for details.
Control & Data	
Wireless Connectivity	IPV4 / IPV6 connectivity via internal aether mesh module providing a self configuring, self healing wireless mesh
Wireless Frequency	915 MHz (US & Canada); 868MHz (Europe)
Wireless Range	500 feet indoors typical through most walls, 2500 feet line of sight
Control interface	Control unlimited fixtures and zones of fixtures via the GrowFlux App for iOS and Android, the GrowFlux API, or GrowFlux Control Panel browser based interface
Schedule Management	Stores up to 90 days of scheduled lighting events; tolerant to internet outages, loss of wireless connectivity, and intermittent power
Mobile App Integration	Real time integration with the GrowFlux App for iOS and Android
Energy data	Real time and cumulative energy consumption data available via app, browser interface, and API
Notifications	Notifies operators in cases of fan blockage, power failure, and high operating temperature conditions
Third party controls	Integration via the GrowFlux API over LAN or cloud; contact GrowFlux for additional details
Operating Conditions	
Operating Temperature Range	-30°C to +40° C (-22°F to +104°F)
Operating Humidity Range	20% RH to 95%+ RH; safe to operate in condensing humidity environments
Safety & Certifications	
Safety Compliance	US & Canada: Certified to UL 1598, UL8750, CSA C22.2 No. 250, and CSA C22.2 No.250.13 MET #E114652
EMC Compliance	FCC Part 15 Subpart C & RSS 247; FCC Part 15 B & ICES-003.
Power Supply Certifications	Internal power supply conforms to UL60950-1, UL8750(type"HL"), CSA C22.2 No. 250.13-12, ENEC EN61347-1, EN61347-2-13 independent, EN62384, J61347-1, and J61347-2-13
Materials Compliance	RoHS Compliant
Electrical Specifications	
Input Voltage Range	90 ~ 305VAC (-SV option); 180 ~ 528 VAC (-HV option)
Input Frequency Range	47 ~ 63Hz
Power Factor	PF>0.98/115VAC, PF>0.95/230VAC, PF>0.93/277VAC, PF >0.97/347VAC , PF>0.96/480VAC @ full load
Typical Power Consumption	624 watts typical @ full load
Standby Power Consumption	<0.5W with light off and wireless connectivity active
Power cable	Detachable UV resistant power cable with NEMA6P seal when mated. Ordered separately. STOW PVC jacketed, 3x16AWG, length and plug specified by customer
Mechanical Specifications	
Dimensions	385mm x 239mm x 189mm (15.2" x 9.4" x 7.5")
Weight	12.25 Kg (27 pounds)
Ingress Protection	Fans are rated to IP68K. Internal power supply is tested to IP67. Fan connectors and internal cables are designed to IP67. Controls enclosure and LED engines are designed to IP65.
Construction	Constructed from anodized T6365 aluminum, powder coated cold rolled steel, and anti-reflective, fingerprint resisant low iron glass
Mounting	2x 1/4-20 threaded holes on top of fixture accepts eye bolts Fixture can also be mounted with standard V hooks

ORDERING INFORMATION

Typical Part Number

GFX - FXS - 600TL - IN - NA - SV

1

2

3

4

5

1 - Series Name

FluxScale

2 - Model Number

600TL - 600 Watt Top Light

3 - Spectrum Capabilities

IN - Infor vegetative 600W & flowering 600W; 80CRI White, Deep Red, Royal Blue, & Far Red

GH - Tunable broad spectrum supplemental; Deep Red, White, Blue, & Far Red

4 - Region

NA - North America, 900 MHz wireless

EU - Europe, 868 MHz wireless

5 - Voltage Option

SV - 100 - 277VAC, 50/60Hz

HV - 277 - 480 VAC, 50/60 Hz (coming soon)