

PG SERIES PLANT GROWTH CHAMBER

PG Series Overview

It is quiet, easy to clean, highly reliable and ideal for plant growth use, it offers hot gas bypass control of refrigeration and resistive heat to facilitate reliable, temperature and optional humidity control.

PG011

The PG011 is a bench top plant growth chamber designed to fit on 24" benchtops; stacked with optional racking.

PG034

The PG034 is a single-door plant growth chamber providing extra cubic feet designed for maximum capacity while still allowing passage through most commercial doorways.

PG068

The PG068 is a wide double door plant growth chamber. This Chamber gives researchers additional growing room for their plants.

PG SERIES: PLANT GROWTH CHAMBERS

The PG series chambers feature hot gas bypass technology which controls the temperature of the epoxy coated evaporator for greater uniformity. Compressors in our PG series of environmental chambers come with a three-year warranty – which is the longest in the industry.

Quiet Operation

The PG chambers utilize quiet and highly efficient DC fans. Locating these chambers in laboratory workspaces is a viable option.

Lighting

The lighting that is included in the PG is standard with programmed dimming capabilities to achieve 150-2000 $\mu\text{mol}/\text{m}^2/\text{s}$ (8") of high PAR spectrum light output making this useful for entomology, Arabidopsis, tissue culture, C3, C4, cannabis, algae, and general corn, wheat, or soybean plant studies. Dimming is "all at once" type. Fixtures are attached to (removable) shelves with an adjustable hanging system.

- Efficient LED lighting dimmable between 5% and 100% in 1% increments.
- Less heat generated from power waste than comparable HID or fluorescent lamps.
- High quality photosynthetically active spectrum targeting plant growth.
- LED lighting uses less energy and has a longer operation life than traditional lighting.
- Combination 3000K, 4000K, and 660nm ultra efficient diodes

Widely used options for plant growth chambers

1. LED lighting
2. T5HO bulbs
3. T8HO bulbs
4. Touchscreen controller (controls 3 outputs)

Airflow

Airflow is through back wall plenum down to bottom of chamber for minimal plant disturbance and maximum uniformity.

Virtual Touchscreen/Controls

Users can view process value and set point from front of the chamber as the actual PID controllers are placed in this location. The controllers can still be interfaced with or locked out, and only controlled via the virtual touchscreen. The virtual touchscreen is a CE and UL listed feature that can be accessed through the free viewer app (Easy Access) provided from a mobile device or desktop. Normal customer set-ups monitor or program multiple chambers through a phone or PC.

Included advantages:

- Data logging with the ability to verify the integrity of the data via

the EASY Converter tool

- USB storage up to 32GB can be used for data log files and accessed via web browser or FTP. These files can be emailed daily and weekly
- Built in 4GB flash memory and RTC (Real Time Clock)
- Allows for users to be logged in while having different levels of access, also includes an automatic log off function
- Alarm notification: Preprogrammed email or text (phone carrier name required) will be setup that contains brief trouble shooting help notes and phone number plus link to Darwin Chambers technical support team. Chamber(s) can be named by user to identify which chamber is in alarm. Preprogrammed text and email alarm events able to be categorized to different levels. Email and/or text will also be sent to notify user when chamber goes back into spec and is out of alarm.
- SD card slot for expansion of storage and one USB hot port and 2 gigabit ethernet ports
- Programmable temperature and dimming of lights

Options Available

Extended Temperature Range**
Chart Recorders
Data Loggers
Pneumatic & Desiccant Wheel Dryers**
Window or Glass door. **
Full swinging interior glass door
Magnetic latch door handle with lock and two keys (011 and 034)
Touch Screen interface
Headless interface (Virtual Touch Screen VTS)
Other control Options or monitoring i.e., CO₂.
Adjustable Fan Speeds. **
Air exchanges filtered or non-filtered with ambient space. **
Condensate drain pumps.
Interior or exterior electrical outlets. (Limited power) **
Humidity**
5 gallon carboy (if no hookup to waterline available)
Door ajar alarm

***Some Options may limit chamber performance less or greater than specified here.*

Greatly Reduced Direct and Indirect Energy Loads

The PG Series chambers utilize less energy than comparable stability chambers and introduce less impact upon building cooling systems. This efficiency “dual benefit” allows our chambers to be in spaces unsuitable for other chambers. Electrical energy savings by the PG Series vs. steam boiler equipped chambers can easily amount to hundreds or thousands of dollars saved per year. Based on Alarm event settings the chambers controller can optimize performance to use or not use compressor depending on set point temperature.

Widely Proven, Non-Proprietary Controllers

Standard controllers for the PG Series are manufactured by Fuji Electric and are ideal for plant growth chambers. Unlike many proprietary controllers, this controller is commercially available and proven in tens of thousands of installations. Standard functions include: autotuning, fuzzy logic, PID control, programmable alarms, calibration correction capability, ramp/soak, uniformity offset capability, etc. A touchscreen control interface is optional. Other controller manufacturers are also supported (Watlow, Allen Bradley etc.)

Services and Warranties

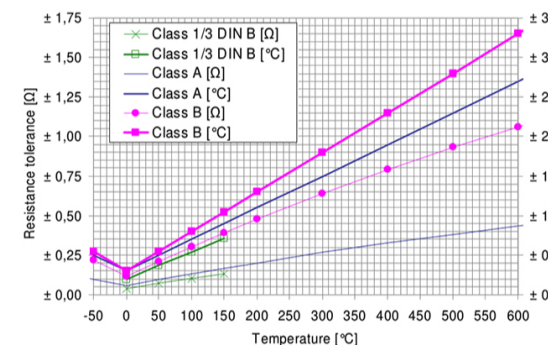
We offer technical support throughout the lifetime of your chamber. In addition to standard warranties, we also offer extended warranties for cooling components, parts, and labor. We also provide qualifications, validations, and preventive maintenance services at an additional cost.

PG Series Plant Growth Chamber Specifications (ambient 23° C)

Temperature		
Performance	Standard	Optional
Temperature Range	4° C to 45° C lights off 10° C to 45° C lights on	-5° C to 70° C with Optional Defrost
Ambient Temperature	21° C ± 3° C	
Temperature Control	± 0.2° C	
Control Resolution	0.1° C	
Temperature Sensor Type	3 wire PT100 Class A RTD	

The graph plots Resistance tolerance in Ohms (Ω) on the y-axis (ranging from ±0.00 to ±1.75) against Temperature in degrees Celsius (°C) on the x-axis (ranging from -50 to 600). It compares the performance of three RTD classes: Class 1/3 DIN B, Class A, and Class B. For each class, two lines are shown: one for resistance tolerance in Ohms (Ω) and one for resistance tolerance in degrees Celsius (°C). Class B shows the highest tolerance, followed by Class A, and Class 1/3 DIN B shows the lowest tolerance. All classes show an increase in tolerance with increasing temperature.

Temperature [°C]	Class 1/3 DIN B [Ω]	Class 1/3 DIN B [°C]	Class A [Ω]	Class A [°C]	Class B [Ω]	Class B [°C]
-50	±0.05	±0.05	±0.10	±0.10	±0.25	±0.25
0	±0.05	±0.05	±0.10	±0.10	±0.15	±0.15
50	±0.05	±0.05	±0.10	±0.10	±0.25	±0.25
100	±0.05	±0.05	±0.10	±0.10	±0.35	±0.35
150	±0.05	±0.05	±0.10	±0.10	±0.45	±0.45
200	±0.05	±0.05	±0.10	±0.10	±0.55	±0.55
300	±0.05	±0.05	±0.10	±0.10	±0.75	±0.75
400	±0.05	±0.05	±0.10	±0.10	±0.95	±0.95
500	±0.05	±0.05	±0.10	±0.10	±1.15	±1.15
600	±0.05	±0.05	±0.10	±0.10	±1.35	±1.35



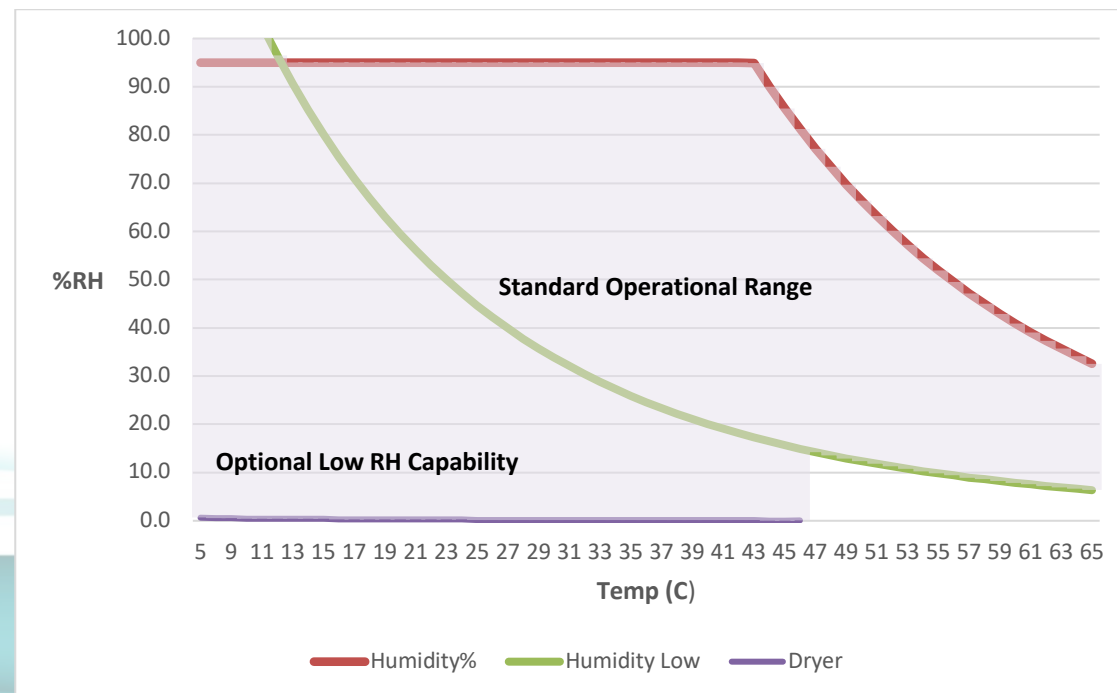
Optional Humidity		
Performance	Standard Option	Optional
Humidity Range	Ambient Absolute Humidity* to 90% Relative Humidity @ 42°C Dewpoint	2 to 95% @ 22° C (or other ranges)
Humidity Control	± 0.3%	
Control Resolution	0.1%	
Humidity Sensor	<p>Rotronic HC2A-S Operating range -50...100 °C / 0...100 %RH Accuracy: ±0.8 %RH, ±0.1 K, at 23 °C ±5 K Digital interface (UART) and scalable analogue outputs, 0...1 V</p> <p>RH Sensor Accuracy Overview</p>	Vaisala or other

*Absolute Humidity is the amount of moisture in the air in a particular environment.

The humidity chart below shows the chamber's humidity capabilities.

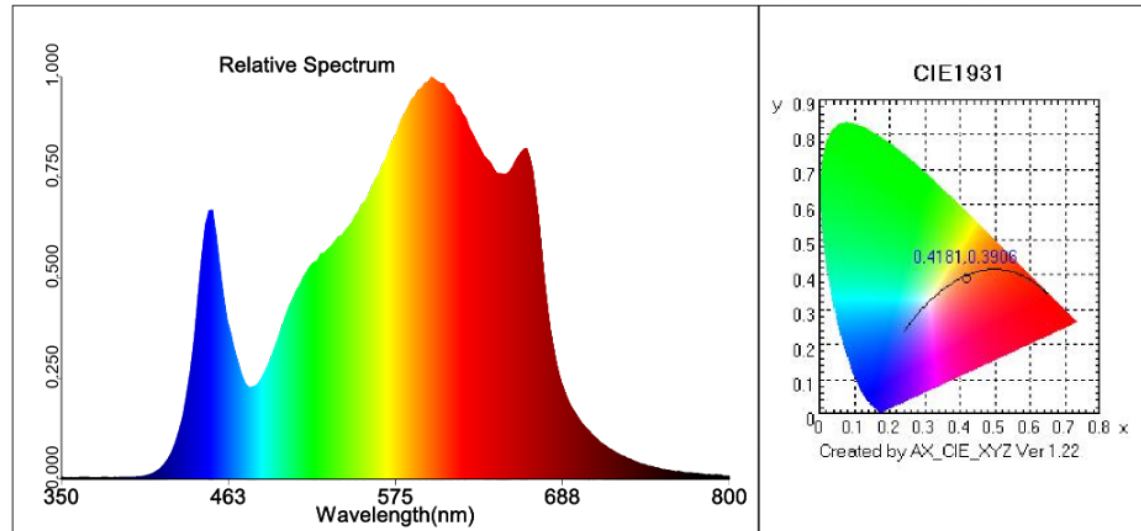
How to read the chart below:

The Humidity% Line in red is the max humidity level that can be achieved by staying within the 42°C dew point. Humidity levels above this line are not recommended. The Humidity Low line in green is the lowest the chamber can go without the use of a dryer. This is based on ideal performance and ambient condition of 23°C and 50% RH. Lower or higher ambient conditions will impact the lower humidity capabilities of your chamber. If your set points are near this line or below it is recommended to add dryer capabilities to your chamber. The Dryer Line in purple represents the use of a pneumatic dryer with a -40 Dew Point. To reach such low humidity, a constant supply of dry air is needed, and manual adjustment to humidity valve may be needed. Alternatively, if low %RH (low dewpoint) is desired but dry compressed air is not available, other dryer types are available.



*Humidity% represents chamber performing at 42°C Dew point.
Humidity Low represents absolute humidity at ambient space of 23°C and 50%RH.*

LED Light PAR Spectrum



Dimmable range between 5% and 100%

112	135	141	130	105
121	145	152	141	112
121	146	153	143	114
121	149	156	146	116
121	150	157	146	116

10% Brightness (24W)


$\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$

1511	1845	1922	1778	1427
1630	1973	2073	1920	1513
1620	1992	2090	1940	1533
1630	2004	2110	1973	1583
1602	1988	2089	1967	1564

100% Brightness (240W)




$\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$

Light intensity measurement at a distance of 8" over 20" x 20" area




Control System	Standard	Optional
Controller	Fuji PXF4	Gefran 650, Future Design Controls CM and MCT4 + More
Control Readout	Actual and Set-Point Values 	Trending, Duty Cycle
Indication Accuracy	RTD input: $\pm 0.2\%$ of indication value ± 1 digit or $\pm 0.5^\circ\text{C} \pm 1$ digit, whichever is larger	Dependent on optional Controller
Sample Rate	Fast as 50 ms	Dependent on optional Controller
Control Speed	Fast as 100 ms	Dependent on optional Controller
Control Type	PID - Fuzzy Logic (9 types available)	Dependent on optional Controller
Auto Tuning	YES	Dependent on optional Controller
Calibration Correction Capability	± 0.1 lower and upper scale	Dependent on optional Controller
Uniformity Off Set	± 0.1 Resolution Linear adjustment	± 0.1 Resolution
Alarm	High / Low Audible and Visual	Text, Email, Web Server, Remote Access
Alarm Type	High / Low Deviation in 0.1 resolution with adjustable Delay. Control audible alarm enable or disable components.	Absolute & Deviation 0.1 Resolution with Delay
Remote Monitoring / BMS connection	Double throw Dry Contact Alarm, Email alerts with included VTS**	Ethernet & Analog Output (Specify voltage or mA)
Password Protection	Hexadecimal on Controller and alpha numeric with the included VTS also multiple users	Numeric, Alpha Numeric
Audit Trail	On included VTS*	Dependent on optional Controller
Universal Power Supply for Monitoring	Not Standard	Available. Controllers and sensors powered during outage for data logging. Chamber operation not supported.
Ramp Soak Function	24 hour step program and 16 step program. Step include 1 ramp and 1 soak. Programs can be named and loaded into controller via the VTS.	Dependent on optional Controller




*Applies with touchscreen or VTS option.




**For BACNET or MODBUS TCP (Ethernet) please contact your BMS vendor about using a gateway to interface with controllers via the RS485.

	PG011	PG034	PG068
PG			
Construction			
Exterior	Powder Coated Finish	Powder Coated Finish	Powder Coated Finish
Exterior Material Thickness	Heavy Gauge	Heavy Gauge	Heavy Gauge
Interior	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Interior Material Thickness	.036"	.036"	.036"
Door QTY	1	1	2
Door Lock	Optional	Optional	Optional
Door Swing	+180°	+180°	+180°
Door Gasket	Magnetic Gasket	Magnetic Gasket	Magnetic Gasket
Shelving Material	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Shelf Quantity per Door	2	3	3
Casters Height	2.75"	2.75"	2.75"
Caster QTY	4	4	5
Caster Locking Brakes	2	2	2
Access Port Qty	2	2	2
Multi-Purpose ports	YES	YES	YES

Continuous coil coated is treated metal before it is cut and formed, the entire surface is cleaned and treated, providing tightly bonded finish. Formed sides have holes, valleys, recessed areas, and hidden areas that make it difficult to clean and uniformly coat. Coil coated metal is often considered more durable and corrosion resistant than most painted metal as it is treated before shaped.

	PG011	PG034	PG068
PG			
Capacity & Dimensions			
NET Capacity*	9.2 ft ³	29.0 ft ³	62.6 ft ³
Conditioned Space	11.6 ft ³	32.1 ft ³	69.3 ft ³
External Dimensions	36.2W x 27.4D x 47.1H	35.7W x 33.8D x 80.8H	68.4W x 34.2D x 81.8H
Internal Dimensions	29.7W x 23.6H x 22.6D	29.4W x 29.0D x 57.3H	64.2W x 29.4D x 57.3H
Access Port Dimensions	2" ID with Foam Insert	2" ID with Foam Insert	2" ID with Foam Insert
Recommended Clearance	Top 12"	Top 12"	Top 12"
	Rear 6"	Rear 6"	Rear 6"
	Sides 6"	Sides 6"	Sides 6"
Shelf Dimensions	28.9W x 20.4D	28.75W x 26D	31.4W x 24.25D
Shelf Weight Capacity	150 lbs.	150 lbs.	150 lbs.
Approx. Max Storage weight	600	700	1000
Approx. Crated Weight	470 lbs.	765 lbs.	1100lbs

	PG011	PG034	PG068
PG			
Components			
Compressor Size	1/2 hp	1/2 hp	1 hp
Refrigerant	404a	404a	404a
Charge (oz)	13.5 oz	13.5 oz	18.5 oz
Defrost	Optional	Optional	Optional
Heater Watt Size	350	350	600
Heater Qty	1	1	2
Perimeter Heater	Optional	Optional	Optional
Air flow direction	Front to Back	Front to Back	Front to Back
Fan Count	3	3	6
Fan CFM per fan	125	125	125
Variable Speed	Manual Adjust	Manual Adjust	Manual Adjust
Humidity	Optional	Optional	Optional
Water quality	A conductivity of 0.1 µS – 10 µS (Micro Siemens), TDS (Total Dissolved Solids) of less than 10 PPM (Parts per Million), and 1-10 PSI (Pounds per Square Inch) of supply water pressure. ¼" poly tube push to connect fitting for water connection.		
Max Water consumption	1200 ml / 0.32 Gal per Hour	1200 ml / 0.32 Gal per Hour	1200 ml / 0.32 Gal per Hour
Water Connection	¼" poly tube push to connect	¼" poly tube push to connect	¼" poly tube push to connect
** Optional Compressed Dry Air **			
Max use 70 PSI & 200 CFH. ¼" poly tube push to connect fitting. Recommend Compressed Dry air of -40°C Dew point.			

	PG011	PG034	PG068
PG			
Electrical North America			
Voltage	115 VAC/ 60 Hz	115/208-230 VAC /60HZ Chamber & 115 VAC /60Hz Dryer NEMA L14-20P	
RLA	12	12.0 / 6.0	12.0 / 12.0
Heat Rejection	6818 Btu/h***	8455 Btu/h***	10910 Btu/h***
Cord Length	9 ft	9 ft	9 ft
Dedicated Circuit	15 A	15 A	15 A
Electrical International via Buck Boost Transformer			
Voltage	230 VAC/ 50 Hz		
RLA	4.0	4.0	6.0
Heat Rejection	2,839 Btu/h	2,839 Btu/h	4,309 Btu/h
Cord Length	2.74 m	2.74 m	2.74 m
Accessory connections			
BMS Dry Contact	Screw terminal 3 position Common / Normally Closed / Normally Open		
RS485 MODBUS	1/8" or 2.5mm stereo input jack		
Optional Re transmission	Screw terminal		
Dry Air solenoid	Screw Terminal		
Desiccant Wheel Dryer	Twist lock 4 pin din connector		
Aux 24VDC output (500 mA limit)	5.2 mm Barrel Connector		

*Interior Capacity includes the 2" spacing from interior walls to allow for best air flow performance.

**Include width with handle and height with casters installed.

*** Includes Lights ON. 011 = 1 Light, 034 = 3 lights, and 068 = 6 lights; Lights on typically 12 hours per day (dependent on application.)

RLA and heat rejection is based on a controlled operation temperature of 30C and 65% RH. Value may change on operating set points.