Tall Plant growth chambers and rooms are specifically designed to provide maximum growth height and high lighting levels. They are ideal for experiments with cereal crops, shrubs, saplings and horticulture plants.

Features:

- 4.5m² (48ft²) to 17.8m² (192ft²) of plant growth area
- 2030mm (80”) of growth height
- 500µmoles/m²/s P.A.R. of lighting
- Ideal for cereal crops and other plants requiring high light intensities
- Counterbalanced height adjustable lamp canopy maximizing light intensity
- Aisle enables research work to be performed in conditioned space
- Available in 915mm (36”) or 1220mm (48”) deep lamp canopies
Quality product.
Excellent service.
Innovative designs.
INTRODUCTION

BioChambers’ plant growth room series TPR was specifically designed to maximize the light intensity at the tip of the plants by incorporating a counterbalanced adjustable height lamp canopy. As the plants grow, the researcher easily adjusts the height of the lamp canopy to maintain the light intensity at the tip of the plants. Airflow is sent downward in the center aisle to the floor where it is re-directed upward in the plant growth area continuing up through the lamp canopies. A walk-in aisle enables research work to be performed on the plants within the conditioned space. BioChambers’ plant growth rooms provide tight uniform control of temperature, a balanced lighting spectrum using a mixture of fluorescent and halogen lamps, and adjustable airflow.

1.0 CONTROLLER

1.1 Controller Version: BioChambers VNET.

1.2 Interface: Fanless panel PC with a 305mm (12") color touch screen.

1.3 Ethernet Connection: Remote secure access using a unique site specific webkey allowing the chambers/rooms to be connected to a facility supplied local area network (LAN)/internet.

1.4 Security: Multiple levels of password security for researchers, administrators, service technicians, and BioChambers’ factory technicians.

1.5 VNET Viewer: Instantly view the status of all your experiments. Single or multiple chambers/rooms can be remotely monitored and operated from a central location via use of the LAN/internet. VNET Viewer can be installed at up to three existing computer stations.

1.6 Schedule: Multi-line schedule can be created for temperature, lighting, and fan speed using the touch screen interface or remotely using the facility provided LAN/internet. Available options: humidity, carbon dioxide, auxiliary circuits primarily for automatic watering, light intensity, etc… can also be scheduled.

1.7 Multi-Day: Simulation of multi-day changing environmental conditions can be scheduled.

1.8 Ramping: Temperature ramping from setpoint to setpoint. Available options: humidity, carbon dioxide, and dimmable lighting can also be ramped.

1.9 Astronomical Clock: Researchers can produce photo-period schedules for locations worldwide by simply entering the latitude and longitude.

1.10 Graphing: Controlled parameters such as temperature and the following available options: humidity, carbon dioxide, and light intensity can be graphed to show setpoint versus actual conditions.

1.11 Research Data: Controller equipped with a compact flash memory card to store multiple schedules and logged data such as temperature, alarms, etc… Log rate and duration can be set by the user.

1.12 Data Export: Data can be exported to the researchers/administrators computer for further analysis.

1.13 Start-up: Provisions for chamber/room start-up delay in facilities with multiple chambers/rooms helping to reduce the initial inrush current after a power outage.

1.14 Alarms: Notification via e-mails sent to a cell phone or laptop PC, building alarm contacts connected to a facility supplied building security system, and on chamber/room audible alarm with red indicator light.

1.15 Service Data: Refrigeration system pressures and temperatures along with other service parameters are logged. Log rate and duration can be set independently of the research log.

1.16 Service Screen: Displays compressor discharge and suction pressures and temperatures, facility water supply and return temperatures, automatic setting temperature safety limits status, lamp hours, sensor calibration hours, temperature control valve position, and more.

1.17 Service: Two manual toggle switches with a 10 minute schedule bypass are provided for the service technician to place the chamber/room into full cooling or heating and all lights on or off. This enables faster and easier service work as the technician does not need to learn how to use the control system.

Can your plants call you?

With our new Research Saver™ and advanced VNet Controller™ you have the best in modern technology for your valuable experiments. See the VNet and Research Saver brochure for details on this 21st century operating system which protects your research.
2.0 **CONSTRUCTION** (TPR-45 specification, for other models see tables 1 and 2)

2.1 **Exterior Dimensions:** 2945mmW x 2945mmD x 2595mmH (9'8"W x 9'8"D x 8'6¼"H) assembled. Add 915mm (36") to the height for the refrigeration system (custom width, depth and heights are available).

2.2 **Assembly:** Room disassembles for easy installation in the facility. Panel assembly: posi-loc cam type locking action.

2.3 **Interior Dimensions:** 2665mmW x 2745mmD x 1980mmH (8'9"W x 9'0"D x 6'6"H).

2.4 **Growth Area:** 4.5m² (48ft²).

2.5 **Growth Height:** 2030mm (80").

2.6 **Growth Capacity:** 9.1m³ (320ft³).

2.7 **Interior:** 24ga. Smooth galvanized steel with factory baked white enamel finish.

2.8 **Exterior:** 26ga. Stucco galvanized steel with factory baked white enamel finish.

2.9 **Lamp Canopies:** Two 915mmD x 2445mmW (36"D x 96¼"W) adjustable height, non-barriered lamp canopies, counter balanced with ball bearing style pulleys allows fingertip adjustment of the lights vertically.

2.10 **Drain Pan:** Evaporator drain pan constructed of aluminum (drain pan in the plant growth area not supplied). Insulated floor not supplied (see options).

2.11 **Insulation:** 100mm (4") of foamed in place urethane insulation.

2.12 **Electronics:** Filtered air blown into the control panel, providing cooling to the electronics and positive pressure in the control panel keeping dust out, extending the life of the electronics.

2.13 **Service:** Easy access to electronics through lockable doors and mechanical components located on the roof of the room.

2.14 **Instrument Ports:** Two 50mm (2") with light tight covers.

2.15 **Walk-In Door:** One 865mmW x 1980mmH (34"W x 78"H) door with light tight magnetic gaskets, self closing cam lift hinges, closure device, and interior safety door release.

2.16 **Observation Window:** One 320mm x 320mm (12½" x 12½") dual pane glass window with light tight cover.

2.17 **Control Panel:** Display mounted on the left side of the room when facing the door (right side available upon advanced request).

2.18 **Aisle/Vestibule:** 815mmW (32"W) enables research work to be performed on the plants within the conditioned space.

3.0 **TEMPERATURE**

3.1 **Ambient:** Designed for a maximum ambient of 35°C.

3.2 **Range:** 5°C to 35°C all lights off, 15°C to 35°C all lights on (extended temperature options are available).

3.3 **Control:** PID control, +/-0.5°C at the aspirated sensor.

3.4 **Temperature Limits:** Automatically set when the researcher runs a schedule. One high/low and one lamp safety temperature limit sensor independent of the main temperature sensor.

3.5 **Aspirator:** Adjustable, aspirated, and shielded from the lights sensing of temperature.

3.6 **Temperature Sensor:** High precision fast responding thermistor sensor.

4.0 **LIGHTING**

4.1 **Lighting:** T5HO with energy efficient electronic ballasts (other lighting options are available).

4.2 **Intensity:** 500µmoles/m²/s measured at 150mm (6") from the lamp canopy at 20°C and averaged on a 150mm (6") grid.

4.3 **Lamps:** Combination of 1220mm (4ft) T5HO fluorescent lamps, T5HO fluorescent end lamps and halogen lamps.

4.4 **Programming:** Via VNET controller.

4.5 **Lighting Levels:** 4 Levels of fluorescent lighting and 4 levels of halogen lighting, total of 8 lighting levels.

4.6 **Lamp Heat:** Refrigeration system sized to remove all heat generated by the lights.

4.7 **Lighting Relays:** 100% solid state for increased reliability.
Table 1: Specifications for items 2.1, 2.3, and 2.4

<table>
<thead>
<tr>
<th>Model #</th>
<th>Specification 2.1</th>
<th>Specification 2.3</th>
<th>Specification 2.4</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Exterior Dimensions</td>
<td>Interior Dimensions</td>
<td>Growth Area</td>
</tr>
<tr>
<td></td>
<td>Width x Depth x Height</td>
<td>Width x Depth x Height</td>
<td></td>
</tr>
<tr>
<td>TPR-45</td>
<td>2945mmW x 2945mmD x 2595mmH (9’8”W x 9’8”D x 8’6¼”H)</td>
<td>2665mmW x 2745mmD x 1980mmH (8’9”W x 9’0”D x 6’6”H)</td>
<td>4.5m² (48ft²)</td>
</tr>
<tr>
<td>TPR-89</td>
<td>2945mmW x 5285mmD x 2595mmH (9’8”W x 17’4”D x 8’6¼”H)</td>
<td>2665mmW x 5080mmD x 1980mmH (8’9”W x 16’8”D x 6’6”H)</td>
<td>8.9m² (96ft²)</td>
</tr>
<tr>
<td>TPR-134</td>
<td>2945mmW x 7620mmD x 2595mmH (9’8”W x 25’0”D x 8’6¼”H)</td>
<td>2665mmW x 7415mmD x 1980mmH (8’9”W x 24’4”D x 6’6”H)</td>
<td>13.4m² (144ft²)</td>
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TPR Series - 1065mm (42”) Lamp Canopy

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<tbody>
<tr>
<td></td>
<td>Growth Area</td>
<td>Growth Capacity</td>
<td>Quantity</td>
<td>Dimensions</td>
<td>Aisle</td>
</tr>
<tr>
<td>TPR-52</td>
<td>3240mmW x 2945mmD x 2595mmH (10’7½”W x 9’8”D x 8’6¼”H)</td>
<td>2960mmW x 2745mmD x 1980mmH (9’8½”W x 9’6”D x 6’6”H)</td>
<td>4</td>
<td>2915mmD x 2445mmW (36”D x 96¼”W)</td>
<td>815mmW (32”W)</td>
</tr>
<tr>
<td>TPR-104</td>
<td>3240mmW x 5285mmD x 2595mmH (10’7½”W x 17’4”D x 8’6¼”H)</td>
<td>2960mmW x 5080mmD x 1980mmH (9’8½”W x 16’8”D x 6’6”H)</td>
<td>6</td>
<td>2915mmD x 2445mmW (36”D x 96¼”W)</td>
<td>815mmW (32”W)</td>
</tr>
<tr>
<td>TPR-156</td>
<td>3240mmW x 7620mmD x 2595mmH (10’7½”W x 25’0”D x 8’6¼”H)</td>
<td>2960mmW x 7415mmD x 1980mmH (9’8½”W x 24’4”D x 6’6”H)</td>
<td>6</td>
<td>2915mmD x 2445mmW (36”D x 96¼”W)</td>
<td>815mmW (32”W)</td>
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*Custom sizes are available, contact BioChambers to discuss your requirements.

Table 2: Specifications for items 2.4, 2.6, 2.9, 2.18, and 6.3

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<tbody>
<tr>
<td></td>
<td>Growth Area</td>
<td>Growth Capacity</td>
<td>Quantity</td>
<td>Dimensions</td>
<td>Aisle</td>
</tr>
<tr>
<td>TPR-45</td>
<td>4.5m² (48ft²)</td>
<td>9.1m³ (320ft³)</td>
<td>2</td>
<td>915mmD x 2445mmW (36”D x 96¼”W)</td>
<td>815mmW (32”W)</td>
</tr>
<tr>
<td>TPR-89</td>
<td>8.9m² (96ft²)</td>
<td>18.1m³ (640ft³)</td>
<td>4</td>
<td>915mmD x 2445mmW (36”D x 96¼”W)</td>
<td>815mmW (32”W)</td>
</tr>
<tr>
<td>TPR-134</td>
<td>13.4m² (144ft²)</td>
<td>27.2m³ (960ft³)</td>
<td>6</td>
<td>915mmD x 2445mmW (36”D x 96¼”W)</td>
<td>815mmW (32”W)</td>
</tr>
<tr>
<td>TPR-52</td>
<td>5.2m² (56ft²)</td>
<td>10.6m³ (373ft³)</td>
<td>2</td>
<td>1065mmD x 2445mmW (42”D x 96¼”W)</td>
<td>800mmW (31½”W)</td>
</tr>
<tr>
<td>TPR-104</td>
<td>10.4m² (112ft²)</td>
<td>21.1m³ (747ft³)</td>
<td>4</td>
<td>1065mmD x 2445mmW (42”D x 96¼”W)</td>
<td>800mmW (31½”W)</td>
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<tr>
<td>TPR-156</td>
<td>15.6m² (168ft²)</td>
<td>31.7m³ (1120ft³)</td>
<td>6</td>
<td>1065mmD x 2445mmW (42”D x 96¼”W)</td>
<td>800mmW (31½”W)</td>
</tr>
<tr>
<td>TPR-59</td>
<td>5.9m² (64ft²)</td>
<td>12.1m³ (420ft³)</td>
<td>2</td>
<td>1220mmD x 2445mmW (48”D x 96¼”W)</td>
<td>785mmW (31”W)</td>
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<tr>
<td>TPR-119</td>
<td>11.9m² (128ft²)</td>
<td>24.2m³ (833ft³)</td>
<td>4</td>
<td>1220mmD x 2445mmW (48”D x 96¼”W)</td>
<td>785mmW (31”W)</td>
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<tr>
<td>TPR-178</td>
<td>17.8m² (192ft²)</td>
<td>36.2m³ (1280ft³)</td>
<td>6</td>
<td>1220mmD x 2445mmW (48”D x 96¼”W)</td>
<td>785mmW (31”W)</td>
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</table>
5.0 REFRIGERATION
5.1 Condenser: Self-contained water-cooled condenser (other options are available).
5.2 Temperature Valve: No maintenance electronic proportional hot gas bypass system for close temperature control and continuous compressor operation.
5.3 Compressor: Scroll compressor.
5.4 Refrigerant: HFC-404A.
5.5 Evaporator: Copper tube and aluminum fin construction.
5.6 Refrigeration Analysis: Compressor discharge and suction pressures as well as temperatures, and facility water supply and return temperatures are provided and logged for ease of service.
5.7 Safety: One suction pressure switch and one discharge pressure switch with a manual reset is provided on the refrigeration system to prevent short cycling and compressor burn out.
5.8 Barriered Lamploft: N.A.
5.9 Defrost Cycle: N.A.

6.0 AIR DISTRIBUTION (TPR-45 specification, for other models see tables 1 and 2)
6.1 Air Flow: Downward in the center aisle to the floor and re-directed upward in the plant growth area continuing up through the lamp canopies.
6.2 Fan Speed: Adjustable from 60% to 100% (85% or higher recommended, temperature gradients increase at lower fan speeds). Fan speed can be programmed in the VNET controller enabling researchers to vary the airflow through the plants.
6.3 Fresh Air: Filtered fresh air with a manually adjustable vent: 2.8m³/min (100ft³/min).

7.0 RESEARCH SAVER
7.1 Surge Protector: Over voltage protection of the controller and control circuit from electrical surges.
7.2 Uninterruptible Power Supply (UPS): Protects the controller and control circuit from brown outs, surge conditions, and momentary loss of power.
7.3 Power Phase Detector: Loss of power phase alarm protects the compressor and other components.
7.4 Factory Diagnostics: Via a facility supplied LAN/internet connection a technician at the factory can access the chamber/room to analyze the mechanical, electrical, and control systems.
7.5 Testing: 100% assembled, tested and run-in at the factory before being disassembled for shipment to the site reducing on-site assembly time and disruptions.

8.0 WARRANTY
8.1 Duration: Two years parts and labor.
8.2 Diagnostics: Additional years three to five remote diagnostics service.

9.0 ELECTRICAL
9.1 Service: 120/208V/3-phase/60Hz/4 Wire + ground (50Hz option: 240/415V/3-phase/50Hz/4 Wire + ground). Electrical service to be provided by others (contact BioChambers for utility requirements).
9.2 Electrical Safety: Chamber/Room is CSA inspected (CE where applicable).

10.0 INSTALLATION & CUSTOMER TRAINING
10.1 Manuals: Controller manual, operation & maintenance manual, and electrical schematics provided.
10.2 Training: On-site training on the controller, electrical, and refrigeration system by a factory technician. (Extra charges may apply to chambers/room shipped outside of Canada or the U.S.A.)
10.3 Installation: Installation not included. Please consult with BioChambers for installation options.

11.0 OTHER
11.10.b CONSTRUCTION
11.10.1 Door access to plant growth area is lockable.
11.15.b RECEPTACLE
11.15.1 One interior wall mounted GFI receptacle located at the center of the back wall and 460mm (18") above finished floor: 120V/1 phase/6 amp circuit (50Hz option: 240V/1 phase/6 amp circuit).
11.15.2 Consult with engineering for additional receptacles on separate/larger circuits.
**Available Options**

Biochambers Rooms and Chambers are available with a variety of options and accessories. If your research has specific requirements, BioChambers can outfit your equipment to meet your needs. These are just a few of the standard options Biochambers has available. Ask for more information.

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<th>DISPLAY</th>
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<td>HOSE BIB MANUAL</td>
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| ADDITIVE CO2 SCRUBBER   |                  |                  |
| CO2 SCRUBBER           |                  |                  |
| METRO STYLE BENCHING    |                  |                  |
| IRIGATION PROGRAMMED OUTPUT |              |                  |
| HOSE BIB MANUAL         |                  |                  |
TPR Series 1065mm (42”) Models
TPR-52, TPR-104, and TPR-156

1. Control Panel
2. VNET View or VNET Touch Display
3. Door Opening 864 [34] x 1981 [78]
4. Fresh Air
5. Exhaust Air
6. Refrigeration System
7. Instrument Ports
8. Ballast
9. Viewing Window
10. Height Adjustable Lamp Canopy
11. Counter Weight
12. N/A
13. Receptacle

CUSTOM SIZES AVAILABLE. CONTACT BIOCHAMBERS TO DISCUSS YOUR REQUIREMENTS.

BIOCHAMBERS CAN MANUFACTURE THIS PRODUCT WITH THE CONTROL PANEL MOUNTED ON THE RIGHT SIDE UPON ADVANCED REQUEST.

SECTIONED FRONT VIEW
SECTIONED SIDE VIEW

Metric [Imp]
- Ethernet connection
- Deionised water connection (if option selected)
- Electrical connection
- Floor Drain Location
- Cooling water or refrigeration line connections for condenser
- Electrical line connections for condenser (if option selected)
- Air supply (required for humidity option)
TPR Series 1220mm (48”) Lamp Canopy Models
TPR-59, TPR-119, and TPR-178

Metric [Imp]

- Ethernet connection
- Delonised water connection (if option selected)
- Electrical connection
- Floor Drain Location
- Cooling water or refrigeration line connections for condenser
- Electrical line connections for condenser (if option selected)
- Air supply (required for humidity option)

1. Control Panel
2. VNET View or VNET Touch Display
3. Door Opening 864 [34] x 1981 [78]
4. Fresh Air
5. Exhaust Air
6. Refrigeration System
7. Instrument Ports
8. Ballast
9. Viewing Window
10. Height Adjustable Lamp Canopy
11. Counter Weight
12. N/A
13. Receptacle

CUSTOM SIZES AVAILABLE. CONTACT BIOCHAMBERS TO DISCUSS YOUR REQUIREMENTS.

BIOCHAMBERS CAN MANUFACTURE THIS PRODUCT WITH THE CONTROL PANEL MOUNTED ON THE RIGHT SIDE UPON ADVANCED REQUEST.

CLEARANCE HEIGHT

2597 [102]

1067 [42] DOOR SWING

1220mm (48”) Lamp Canopy Models

SECTIONED FRONT VIEW

SECTIONED SIDE VIEW