

# Plant Growth Chamber MPGC20



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## Product Overview/Applications

The MPGC20 offers an unprecedented growth area-to footprint ratio. With the entire refrigeration and electrical systems top-mounted, the provides 20 ft<sup>2</sup> (1.8 m<sup>2</sup>) of growth area in a footprint of less than 25ft<sup>2</sup>. Using a counter-balanced light canopy, the growth height extends to a maximum of 59" (1500mm) inches making the MPGC20 an ideal candidate for research involving tall plant species to full maturity. Please consult Meditech regarding specific requirements.

## Lighting

The standard lighting configuration for the MPGC20 combines fluorescent and incandescent lamps thus providing a broad based light spectrum. The light fixture is counter-balanced for ease of height adjustment between the lamp canopy and the plants. Standard light intensity is 700 micromoles/m<sup>2</sup>/s which is measured by a quantum light meter and transmitted to the controller for user readout.

## Airflow

Airflow for the MPGC20 is distributed uniformly upward using Meditech's innovative Uni-floor air distribution plenum. The airflow is sufficient to promote uniformity as well as proper gas exchange at the plant's leaf surface. The unit includes fresh air intake and exhaust ports which are adjustable to allow up to 20 ft<sup>3</sup>/min (0.57m<sup>3</sup>/min) of air exchange.

## Refrigeration

Cooling for the MPGC20 is provided by a top mounted water cooled condensing unit with hot gas bypass for continuous compressor operation. An electronic modulating valve provides tight temperature control while ensuring quiet operation. Pressure transducers are included for monitoring the status of the refrigeration system. Alternative refrigeration methods are available depending on site-specific and/or user-defined requirements. Consult the factory for heat rejection information and other cooling options.

## Experiment Protection

User programmable "set and forget" alarms track the chamber's operation versus user-defined set points. This allows for exceptionally accurate monitoring without the need for adjustment every time the set point is redefined. Backup "high/ low" alarms provide a further level of protection while visual and audible notification is provided when any alarm is activated. Contacts for connection to a building management system are also included.

## Key Product Attributes

- Large 20ft<sup>2</sup> growth area with minimal product footprint
  - Fluorescent and incandescent lamp canopy is vertically adjustable within the 59" usable growth height
  - Refrigeration system uses top-mounted water-cooled configuration
  - Top-mounted machine compartment minimizes footprint, accommodates serviceability, and simplifies installation
- Product certifications/markings; (NRTL), CE



## Performance Data

Temperature Range (°C)	Interior Capacity	Growth Area	Growth Height	Exterior Dimensions (WxDxH)	Light Intensities (6in. from lamp)	Electrical Service	Weight
10 – 40 lights on	103ft <sup>3</sup>	20 ft <sup>2</sup>	59"	100" x 35.5" x 101"	700 μmoles/m <sup>2</sup> /s	120-1Ø-60Hz	1660 lb.
4 – 40 lights off	29515L	1.9 m <sup>2</sup>	1500 mm	2540 x 900 x 2565 (mm)	@ 25°C	220-1Ø-50Hz	753 kg

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- 1.0 Control System: 7" Meditech touch screen controller
- 2.0 Construction: (Note: All dimensions are nominal.)
- 2.1 Exterior Dimensions: 100"W x 35.5"D x 101"H (2540mmW x 900mmD x 2565mmH) (106"H with service cover opened.).
- 2.2 Interior Dimensions: 97"W x 30.5"D (2465mmW x 775mmD).
- 2.3 Growth Area: 20ft<sup>2</sup> (1.9m<sup>2</sup>)
- 2.4 Growth Height: 59" (1500mm)
- 2.5 Floor: Perforated aluminum channel floor for uniform upward air flow – Uni-floor
- 2.6 Cabinet Construction: Bonded paneling using CFC-free insulation.
- 2.7 Exterior Finish: Blue-green enamel baked on patterned aluminum.
- 2.8 Interior Finish: Reflective white enamel baked on smooth Stainless Steel on front wall, doors and back wall. End walls have reflective specular Stainless steel finish.
- 2.9 Condensing Unit Access: Compressor and refrigeration components located on top front of chamber.
- 2.10 Doors: Two reach-in doors with keyed magnetic locks.
- 2.11 Observation Window: Two (2) dual pane windows with light tight cover.
- 2.12 Control Panel: Center mounted.
- 2.13 Instrument Ports: Two ports, 2" (50mm) with light tight caps.
- 2.14 Anchoring: Unit is secured to floor using concrete anchors.
- 2.15 Packaging: Factory assembled, tested and fully crated

### 3.0 Lighting:

- 3.1 Intensity<sup>1</sup>: Approximately 700 micromoles/m<sup>2</sup>/s.
- 3.2 Programming and Control: 3 level programming of lamps.
- 3.3 Lamps: Balanced spectrum for plant growth using T8 fluorescent lamps and tungsten incandescent lamps.
- 3.4 Lamp Canopy: Adjustable.
- 3.5 Lamp Heat: Removed by refrigeration system.
- 3.6 Ballasts: High efficiency electronic and easily accessible.
- 3.7 Light Meter: Quantum light meter for display and recording of light output.

### 4.0 Temperature Control: (Maximum design ambient temperature is +35°C)

- 4.1 Range: +4°C to +45°C lights OFF, +10°C to +45°C lights ON.
- 4.2 Control 2: ±0.5°C, at control point.
- 4.3 Temperature Safety Limits:

**Primary:** A programmable min and max temperature limit alarm or a limit tracking alarm that automatically follows the programmed set point.

**Secondary:** An independent factory-set high and low temperature limit is also provided for increased assurance.

An audible alarm is standard for both limits. Activation of temperature safety limit set points turns off power to the chamber.

- 4.4 Aspirator: Located in the growth area for accurate controlling and recording of chamber conditions.

<sup>1</sup> Average Light measurement at 6" (150mm) from lamp barrier on 6-inch grid, chamber and ambient temperature of 25°C. Light intensities are nominal values measured at the rated chamber supply voltage. (Measured by a LI190 Quantum Sensor).

<sup>2</sup> Measured by Precision Thermistors, measured without test materials or optional accessories.



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## 5.0 Refrigeration:

- 5.1 Condensing Unit: Cabinet is supplied with a water-cooled hermetically sealed condensing unit with hot gas bypass system for continuous compressor operation, extended compressor life and close temperature control. Condensing unit is located in the machine compartment, and includes a 3-way water modulating valve and hand operated shut off bypass valve. Maximum pressure drop across the condenser and water valve not to exceed 10pis (0.7 bar).
- 5.2 Valve: Electromagnetic 3-way proportional valve that smoothly modulates the heating and cooling functions of the chamber.
- 5.3 Heat Exchanger Coil(s): Copper-tubed construction.
- 5.4 Refrigerant: Refrigeration system is charged with CFC-free refrigerant.
- 5.5 Monitoring:
- Refrigeration system operation is monitored by the control system, including visual and audible alarm.
  - Pressure transducers allow for real-time diagnostics for preventative maintenance & repair.

## 6.0 Air Flow:

- 6.1 Vertical: Optimized air flow, provided by centrifugal impellers, is directed to growth area uniformly upward via Uni-floor system.
- 6.2 Fresh Air: Individual adjustment of positively sealed inlet and outlet from open 20ft<sup>3</sup>/min (0.57m<sup>3</sup>/ min) to closed.

## 7.0 Humidity Control: (Optional)

- 7.1 Range: No control on basic unit. (Refer to Humidity under Optional Accessories)

## 8.0 Carbon Dioxide Additive Control: (Optional)

- 8.1 Range: No control on basic unit. (Refer to Carbon Dioxide Additive Control under Optional Accessories)

## 9.0 Utility Requirements<sup>3</sup>: (Rating increases with some options.)

- 9.1 Electrical Service: 60Hz: 50Hz: (Alternative services available, consult factory)
- 120/208-3Ø-60Hz-4 wire plus ground
  - 220/380-3Ø-50Hz-4 wire plus ground
- 9.2 Drain: Floor drain must be provided outside footprint of cabinet.

## 10.0 Installation: (Optional)

- 10.1 Not included, to be performed by others. Installation is available upon request, please consult factory.
- 10.2 Should installation or technical support be required thorough Meditech's Technical Service group, additional charges may apply.

This unit will tolerate  $\pm 10\%$  voltage fluctuation from the rated voltage on the serial plate. A voltage stabilizer must be used if the fluctuation is greater than  $\pm 10\%$ . Failure to do so can result in serious damage to the compressor and electronic components and will void warranty. Disconnect switch must be sized by a local qualified electrician.



<b>PROGRAMMING</b>	Can be modified according to customers requirements	
<b>UPS</b>	Uninterrupted Power Supply	Surge protection and uninterrupted power supply, on controller only, for continuous operation of the controller during power interruptions, duration of the UPS is approx. 15 minutes. (Consult factory for increased duration, if required.)
<b>LIGHTING</b>		
<b>HL</b>	High Light	Intensity 1125 micromoles/m <sup>2</sup> /s using T5 fluorescent and tungsten incandescent lamps. Independent, 5 level programming of both lamp types. (Note: Amperage increases, consult factory)
<b>HUMIDITY</b> (Based on +21°C and 50% RH ambient condition)		
<b>DHS</b>	Dry Humidity Sensor	Dry Electronic Sensor that directly measures and displays relative humidity in %RH by means of constant display (Not required if ordering additive humidity control option.)
<b>SNH</b>	Spray Nozzle Humidification	Range: Up to 90% RH lights OFF and 85% RH lights ON, limited by a +25°C maximum dew point. Additive humidity through use of spray nozzles. Range given in an empty chamber. Chamber may achieve higher levels with plant loading. Control: ±3% RH. System uses a dry humidity sensor to directly measure humidity in %RH (no wet sock). Spray nozzles require a 60 psi (4.2 bar) pressure and must be supplied with clean water to the following specification; pH = 7.0 ± 0.5, filtration <2 microns (0.00008 in) and resistivity between 0.5 and 1.0 Meg Ohms. Maximum water usage to maintain specified levels is 2 liters/hr. If the above water pressure is not available the CPSNH option is required to supply necessary pressure.
<b>CPSNH</b>	Compact Pump Spray Nozzle Humidification	Compact pump and reservoir for spray nozzles. Order this option with SNH if the minimum 60 psi (4.2 bar) water pressure is not available. Supplies pressurized water for up to 12 nozzles
<b>RES</b>	Reservoir	Pressure reservoir at downstream chambers. Must be ordered for all downstream chambers fed from CPSNH.
<b>SCD</b>	Separate Coil dehumidification	Separate coil dehumidification. (Please contact factory with requirements.)
<b>Carbon Dioxide Additive Control</b>		
<b>CO2</b>	Carbon Dioxide	Package includes gas analyzer, control valve, and injection system. Additive Control CO2 tank not included.



# Plant Growth Chamber

## MPGC20

### CONSTRUCTION

GH67	Growth Height Extension	Growth height increases to 67”H (1700mmH). Exterior height becomes 106” (2690mmH) (111”H (2820mmH) with service cover opened)
S	Shelves	Additional corrosion resistant wire shelves may be added. (One supplied with basic unit.)
MAN	Manual	Additional Operator’s Manual. (One supplied with basic unit.)
RAC	Remote Outdoor Air-Cooled Condenser	Remote outdoor air-cooled condenser complete with all weather housing, low ambient operation controls and low noise level operation. Remote location (up to 50’ [15m] combined horizontal and vertical distance) of condenser only, compressor, receiver and other refrigeration components remain in cabinet machine compartment. Order “RACH” for climates with ambient temperatures from +35°C to +45°C for extended periods. Electrical: 60Hz - 208-230-1Ø-60Hz-3wire plus ground, 50Hz - 220-1Ø-50Hz- 2wire plus ground. Consult factory for amperages. Note: 1. Inter-connecting refrigeration and electrical lines are not included and must be provided by others. 2. RAC and RACH require a separate electrical service. 3. For remote location distances over 50’ (15m) please consult factory. 4. Must be ordered with an electronic 3-way proportional valve [PV].
PV	Proportional Valve	Electromagnetic 3-way proportional valve that smoothly modulates the heating an cooling functions of the chamber. The only moving part of this valve is a floating component within the pressure system, which is totally sealed.
GLY	Glycol	Glycol heating/cooling designed to work with a central chiller refrigeration system. Includes proportional valve control.
FMU	Floor Mounted Condensing Unit	Where ceiling space above cabinet does not allow roof top location, unit is placed on floor adjacent to cabinet. All refrigeration and electrical interconnecting piping and wiring is supplied, providing condensing unit is no more than 5’ (1525mm) from cabinet
ACSC	Air-Cooled Self-Contained Condenser	An air-cooled, self-contained condenser. ( Requires a small chamber extension of 8” (200mm) when combined with BDH option).
OACU	Outdoor Air-Cooled Condensing Unit	Outdoor air-cooled condensing unit containing condenser, compressor, receiver, suction accumulator, control and pressure regulating valves and electrical disconnect. The OACU comes complete with weatherized hood, crankcase heater for low ambient conditions and electromagnetic 3 way proportional valve for smooth modulating heating and cooling of the chamber functions. Inter-connecting refrigeration and electrical lines are not included and must be provided by others. OACU requires a separate electrical service. Electrical: 60Hz - 208-3Ø-60Hz-3wire plus ground, 50Hz - 400-3Ø-50Hz-3wire plus ground. Consult factory for either amperages or other voltages available.



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1. STANDARD REFRIGERATION SYSTEM IS WATER COOLED, (1/2"Ø (13mmØ) CONNECTION).
2. CHAMBER MUST BE SECURELY FASTENED TO FLOOR.
3. DEPTH DIMENSION IS CHAMBER SIZE ONLY. DIMENSION DOES NOT INCLUDE DOOR LATCH OR HINGES.
4. FOR BACK TO BACK INSTALLATION, ALLOW 2" (50mm) SPACE BETWEEN CHAMBERS.
5. LENGTH AND WIDTH DIMENSIONS ±1/4" (6mm), HEIGHT DIMENSION ±1" (25mm). DO NOT SCALE DRAWING.

