

MT51 Plant Growth Chamber



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Product Overview/Applications

The MT51 is a highly customizable plant growth chamber capable of achieving extreme conditions of temperature, lighting levels, and humidity. The product is well suited for research applications requiring a high level of control in a relatively small footprint. In addition to customizable environmental control parameters, options are also available for growth height, gas levels, and a variety of refrigeration configurations. The MT51 offers a minimum growth height of 46" (1170mm) in an 8 ft² (0.7m³) growth area. Please consult Meditech for your specific requirements..

Lighting

The standard lighting system for the MT51 employs a counterbalanced light canopy. This facilitates precise light intensity levels to be maintained throughout the life of the experiment. A balanced light spectrum for plant growth is achieved with a combination of fluorescent and incandescent lamps with options for other lamp types. Standard light intensity is 575 micromoles/m²/s which is measured by a quantum light meter and transmitted to the controller for user readout. Standard lighting control includes four levels per lamp type while higher intensity levels and control are available.

Airflow

Airflow for the MT51 is distributed uniformly upward using Meditech's innovative Uni-floor air distribution plenum. Airflow is sufficient to ensure uniformity as well as proper gas exchange at the leaf surface. Fresh air intake can be adjusted up to 10ft³/min (0.28m³/min) which also helps to ensure adequate ambient gas exchange

Refrigeration

Cooling is provided by a self-contained air-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. Consult the factory for heat rejection information and other options for cooling.

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 on request.

Key Product Attributes

- Designed for Floor Model installation
- Small footprint, yet can accommodate full-size plants
- Standard lighting provides a broad based light spectrum at medium intensity
- Shipped fully assembled – fits through standard Doorways
- 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
-2°C to +40°C Lights Off	32ft ³	8ft ²	46"	71.25" x 29.25" x 76.25"	575 µmoles/m ² /s	120-1Ø-60Hz	990lb.
+5°C to +45°C Lights On	900L	0.74m ²	1180mm	1810 x 750 x 1935 (mm)	@ 25°C	220-1Ø-50Hz	449kg

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1.0 Control System: Meditech 7 inch Touch Screen Controller

2.0 Construction: (Note: All dimensions are nominal)

- 2.1 Exterior Dimensions: 71.25"W x 29.5"D x 76.25"H (1810 mmW x 750mmD x 1935mmH).
- 2.2 Interior Dimensions: 49"W x 24.25"D x 70"H (1245mmW x 620mmD x 1780mmH).
- 2.3 Growth Area: 8ft² (0.74m²).
- 2.4 Growth Capacity: 32ft³ (900 liters).
- 2.5 Floor: Perforated aluminum channel floor for uniform upward air flow – Uni-floor
- 2.6 Growth Height: 46" (1180mm) from Uni-floor to Light right™ in the UP position.
- 2.7 Exterior Finish: Blue-green enamel baked on patterned aluminum.
- 2.8 Interior Finish: Reflective white enamel baked on smooth aluminum.
- 2.9 Cabinet Construction: Bonded paneling using CFC-free insulation.
- 2.10 Door: One reach-in door with keyed magnetic lock, clear opening 25.75" x 48.25" (655mm x 1225mm).
- 2.11 Observation Window: Dual pane with light tight cover 11" x 15" (280mm x 380mm).
- 2.12 Control Panel: Left hand (right hand model optional).
- 2.13 Instrument Ports: Two ports, 1" (25mm) with light tight caps.
- 2.14 Convenience Receptacle: Electrical receptacle located in lamp canopy (2 Amp).
- 2.15 Packaging: Factory assembled, tested and fully crated

3.0 Lighting:

- 3.1 Intensity¹: 575 micromoles/m²/s (higher light intensities are optional).
- 3.2 Programming and Control: Independent, 4 level programming of each lamp type.
- 3.3 Lamps: Balanced spectrum for plant growth using MT51 fluorescent and tungsten incandescent lamps.
- 3.4 Lamp Fixture : Counter balanced for adjustable light intensities – Light right™.
- 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.

¹ 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).

² Measured by Precision Thermistors, measured without test materials or optional accessories.



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- 5.1 Condensing Unit: Cabinet is supplied with an air-cooled condensing unit with hot gas bypass system for continuous compressor operation, extended compressor life and close temperature control. Condensing unit is located in machine compartment.
- 5.2 Heat Exchanger Coil(s): Copper-tubed construction.
- 5.3 Valve: Electronic modulating valve that smoothly regulates the heating and cooling functions of the chamber.
- 5.4 Refrigerant: Refrigeration system is charged with CFC-free refrigerant.
- 5.5 Monitoring: a) Refrigeration system operation is monitored by the control system, including visual and audible alarm.
b) Pressure transducers allow for real-time diagnostics for preventative maintenance & repair.
- 6.0 Air Flow:**
- 6.1 Vertical: Uniformly upward through Uni-floor less than 45ft/min (13.7m/min).
- 6.2 Fresh Air: Filtered inlet and adjustable exhaust 10ft³/min (0.28m³/min).
- 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 Additive Control and Optional Accessories)
- 9.0 Utility Requirements3:** (Rating increases with some options.)
- 9.1 Electrical Service: (Alternative services available, consult factory)
60Hz: 120-1Ø-60Hz-2 wire plus ground
50Hz: 220-1Ø-50Hz-2 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 through Meditech Technical Service group, additional charges may apply.

Cabinet Construction

- 1.The cabinet of MEDITECH refrigerators is insulated with high density CFC free Poly Urethane Foam 120 mm thick insulation.
- 2.Interior chamber is finished resistant stainless Steel (304, 0.8 mm thick).
- 3.The exterior is Sky Blue/white Pure Polyester powder coated (1.0 mm thick) Mild Steel and the door has a magnetic gasket with a keyed lock.
- 4.Stainless steel trays are provided for storage inside.
5. The refrigerators are provided with handle and lock for safety and security.

Refrigeration

1. Heavy-duty, air-cooled refrigeration system
2. Forced air circulation maintains chamber uniformity of +/-1°C and provides quick recovery after door openings
- 3.Non-CFC, commercially available refrigerant
- 4.Automatic condensate evaporator is standard
- 5.Internal evaporator fan(s) shut off during door openings
- 6.Defrost cycle required to maintain constant temperature



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OPTIONAL ACCESSORIES

PROGRAMMING	Can be modified according to customers requirements	
UPS	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.)
TEMPERATURE	Low Temperature Operation	(No fresh air below 4°C.) A defrost cycle will occur resulting in a temperature increase for temperatures set below 10°C lights ON, or 4°C lights OFF. Temperature deviations and defrost time are dependant on chamber operating temperature. During the defrost cycle, the lights will be turned off. Specified light intensity will be reduced when chamber is operating at low temperatures. With temperature ranges below 0°C; cabinet shall include drain pan, drain line and door heaters. Temperature ranges below 4°C with additive humidity option; cabinet shall include purge function. (Consult factory with requirements.)
LIGHTING		
HL	High Light	Fluorescent/incandescent light intensities giving 1000 micromoles/m ² /s using MT51 fluorescent and tungsten incandescent lamps. Independent, 8 level programming of both fluorescent and tungsten incandescent lamps. (Temperature range becomes +4°C no lights, +8°C half lights and +10°C all lights; reduces growth height by 3" [75mm].) Note: Amp draw increases. Please consult factory.
HID	High Intensity Discharge Lighting	High intensity discharge lighting using metal halide and high pressure sodium lamps with a light intensity of 1125 micromoles/m ² /s at a distance of 1 meter from the barrier. Light System uses our Light right TM counterbalanced lamp canopy with lamps separated from growth area by a barrier with openings to allow chamber air to cool the lamps. Upon start-up, lamps experience a 5 to 10 minute warm up period before full light intensity is achieved.
HUMIDITY (Based on +21°C and 50% RH ambient condition)		
DHS	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.)
SNH	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.

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CPSNH	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
RES	Reservoir	Pressure reservoir at downstream chambers. Must be ordered for all downstream chambers fed from CPSNH.
BDH	Bypass Dehumidification	A precisely controlled volume of chamber air bypasses the heat exchanger by means of a proportionally controlled air damper. Using excess capacity in the refrigeration system, moisture is removed from the remaining air by cooling and reheating. Note: 1. Reduces growth height by 3" (75mm). 2. Amp draw increases, please consult factory. 3. Must be ordered with additive humidity control option.
Carbon Dioxide Additive Control		
CO2	Carbon Dioxide	Package includes gas analyzer, control valve, and injection system. Additive Control CO2 tank not included.
CONSTRUCTION		
GHE01	Growth Height Extension	Extended growth height by an additional 12" (305mm) (removable to pass through doorways). Exterior height becomes 90" (2290mm).
GHE02	Growth Height Extension	Extended growth height by an additional 24" (610mm) (removable to pass through doorways). Exterior height becomes 102" (2590mm).
SMC	Split Machine Compartment	Split machine compartment for convenience and flexibility for installation with reduced or limited access. Cabinet component dimensions become; 1. Growth Section – 53.25"W x 29.25"D x 74.25"H 2. Control Section - 21"W x 29.5"D x 74.25"H
RHC	Right-Hand Control Panel	Right-hand control compartment gives you the convenience and flexibility to arrange your chambers in a compact orderly fashion, back to back and end to end, or to facilitate its location in any appropriate space.
S	Shelves	Additional corrosion resistant wire shelves may be added. (One supplied with basic unit.)
CAST	Casters	Heavy duty swivel casters.
GA	Additional Cabinet Sealing	Construction for gas injection experiments. Consists of silicon sealed joints laboratory type inlet and exhaust valves, oil-filled manometer, adjustable hinges and well-fitting gasket plus a valved condensate drain. (Does not provide a "gas tight" environment.)



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RAC	Remote Outdoor Air-Cooled Condenser	<p>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-3 wire plus ground, 50Hz - 220-1Ø-50Hz-2 wire plus ground. Consult factory for either amperages or other voltages available.</p> <p>Notes:</p> <ol style="list-style-type: none">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	<p>Electromagnetic 3-way proportional valve that smoothly modulates the heating and cooling functions of the chamber. The only moving part of this valve is a floating component within the pressure system, which is totally sealed.</p>
GLY	Glycol	<p>Glycol heating/cooling designed to work with a central chiller refrigeration system. Includes 3-way proportional valve control.</p>
WC	Water Cooled Operation	<p>Water-cooled hermetically sealed condensing unit with hot gas bypass system for continuous compressor operation, extended compressor life and close temperature control. Condensing unit to be 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).</p>

