environmental control room

Percival® model WE-1012

control system

- IntellusUltra™ control system
- Single-board electronic solid-state design (all of the input, output and Ethernet communication components are integrated on the controller) (a durable membrane keypad is utilized for data entry)
- Controller utilizes a simple menu-driven method for inputting programs and settings
- Three programming styles, Diurnal, 24-hour programming and Non 24-hour programming (elapsed time)
- Highly visible display provides display of settings and chamber conditions
- RTD temperature sensor input
- Programs are created and run in real time
- Ramping and non-ramping program methods available
- Multiple programs can be linked together to simulate natural conditions
- Two calibration offsets per input channel must be provided
- Light lifetime maintenance (the controller maintains the accumulated hours that each light output has been activated — the accumulated hours can be reset for each output)
- Available programmable outputs allow for user specific control requests (i.e. programmable electrical outlets)
- Help system provides help with settings and programs
- Controller can be secured with four-level password protection
- Ethernet port provides communications via a local network or Internet (controller can be accessed directly from the network or Internet)
- The IntellusUltra Web Server option is included for remote monitoring and control of chamber functions (the IntellusUltra Web Server is an Ethernet gateway which can be connected to either a local network or the internet — remote access to the chamber may then take place on any computer using Internet Explorer 6.0+ connected to the same network) (an intuitive, tabular user interface functions within Internet Explorer like a typical web page, so no software installation is necessary)

control system, continued

The following are some of the key features:

- View current set points and process values, alarm status, alarm settings, program operation mode, program steps and controller time
- Modify and run manual settings
- Modify alarm settings
- Configure defrost settings (if applicable)
- View and reset light lifetime for lamp maintenance
- Configure, modify and run diurnal program
- Configure, modify and run multi-step programs
- Sequence multi-step programs
- Modify calibration offsets
- Configure security logins/passwords
- Configure email addresses for alarm and current chamber status notifications (Note: Requires customer supplied e-mail server [e-mail server must allow unauthenticated e-mail to be sent from the server])

WE-1012 specifications (subject to change without notice)

Temp Range with all lights on	Interior Space volume		Total Shelving Floor Area		Maximum Growing Height		Exterior Dimensions width		depth		height		Light Intensity 6" from lamps unless otherwise noted	Tiers
°C	ft^3	m^3	ft^2	m^2	in	cm	in	cm	in	cm	in	cm	$\mu moles/m^2/s$	
7-44±1.0	815	23.1	90	8.4	87	221	120	304.8	139	353.1	104	264.2	1000	1

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construction

- **Exterior Dimensions:** 120"W x 139"D (304.8 cm x 353.1 cm) x 104"H (264.2 cm) (control box adds 7" [17.8 cm] to chamber depth and roof mounted condesing unit adds 24" [61 cm] to chamber height)
- **Interior Dimensions:** 99.3"W x 131"D (252.1 cm x 332.7 cm) x 87"H (221 cm)
- **Growth Area:** 90.3 ft²
- **Growth Height:** 87" between floor and the lamp bank barrier
- **Light Fixture:** Fixed light fixture is separated from the chamber growth space via a thermal barrier (light fixture has an independent temperature control system from the chamber [lamp heat exchangers are provided to dissipate lamp heat])
- **Insulation:** The insulation shall be "foamed-in-place" polyurethane with a 97% closed cell structure and in-place density of 2.2 lbs per cubic foot
  - Overall thickness shall be 4" with an R factor of 32
  - The polyurethane insulation must retain dimensional stability in an operating temperature range of -40°F (-40°C) to 250°F (121.1°C)
- **Door:** The room door is a flush type for a 42" x 78" (106.7 cm x 198 cm) door opening (provided with a magnetic snap-in perimeter gasket, self-closing cam lift gravity hinges, a Posi-Seal door closure, and a key lockable latch handle with an inside safety release)
  - Door jambs are made of fiberglass reinforced plastic
  - Doors include an interior safety release
- **Observation Window:** A thermal-pane 14" x 14" (35 cm x 35 cm) is provided for interior viewing (light tight cover provided)
- **Cabinet Construction:** All rooms are built in panel sections
  - Each section consists of 4" thick urethane insulation, metal interior and exterior surfaces, cam-type fasteners and vinyl gaskets
  - Panels are manufactured in one-foot increments up to a maximum of four feet wide
  - Standard corner sections are 90° angles with either 12" x 6" or 6" x 12" sides
  - Panel edges are made by molding tongue and groove to facilitate assembly
  - A balloon type, NSF-listed PVC gasket is permanently foamed in place on opposite sides of tongue edges to accomplish an air-tight seal between panels
  - Panels are joined by engaging Posi-Locs embedded into the insulated panel edges (Posi-Loc access holes are covered with vinyl snap caps)
  - All interior corners and floor-wall-ceiling joints shall have a ⅜" radius for ease of cleaning

construction, continued

- **Finish:** Standard metal exterior is 26-gauge embossed white galvanized steel, interior wall and ceiling surfaces are 24-gauge smooth steel with a baked white enamel finish (other optional metals are available upon request) (standard exterior ceiling metal is 26-gauge galvalume steel)
  - Interior floor is 14-gauge galvanized steel and designed to support a uniformly-distributed load of 500 lb/ft²
- **Floor:** Insulated floor provided with center drain exiting at front or rear of chamber
- **Instrument Ports:** Two 1" diameter ports provided through front wall
- **Control Cabinet:** Controller shall be mounted at eye level (a clear plexiglass cover shall protect controls from damage and shall be furnished with lock and 2 keys)

lighting

- **Light Intensity:** Up to 1000 µmoles/m²/s @ 6" from lamps
- **Lamps:** Balance spectrum for plant growth using T-5 High Output Fluorescent lamps plus extended life tungsten incandescent lamps
- **Programming and Control:** Photoperiod is programmable via real time controller (see IntellusUltra™ specification sheets) (five programmable levels of fluorescent lighting and two programmable levels of incandescent lighting)
- **Canopy Barrier:** A transparent barrier, located between the lamp canopy and growing space is provided to promote temperature uniformity within the growing space (barrier is optimized to allow light into the growing space, while containing a majority of the heat produced by the lamps within the canopy) (barriers may be easily removed for cleaning or replacement)
- **Light Reflector:** Specular aluminum light reflectors
- **Light Fixture Temperature Control:** Patent pending lamp bank that it is specifically designed to optimize energy efficiency by managing the heat inside the lamp bank
  - Design produces a constant light irradiance throughout the chamber's temperature range
  - Lamp heat exchangers are provided to dissipate lamp heat (an independent temperature controller will keep the lamp bank at the bulb's optimal operating temperature)
- **Light Fixture Design:** Patent Pending Design (filed January 9, 2007, U.S Serial No. 11/621,412)
- **Cooling Unit:** Light fixture is cooled by an independent water cooled condensing unit (condensing unit is activated when a light circuit is energized, thus saving substantial amount of energy)

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cooling/heating system

- **Chamber Cooling Unit:** Water-cooled condensing unit with hot gas by-pass system for continuous compressor operation, extended life and close temperature control (optional outdoor all weather air-cooled condensing unit available upon request)
- **Light Fixture Cooling Unit:** Water-cooled condensing unit with hot gas by-pass system for continuous compressor operation during any lighted cycle
- **Refrigeration Valves:** Solenoid type with extended stem for long life and quiet operation
- **Compressor Type:** Scroll
- **Refrigerant Type:** R-134a
- **Heat:** Via hot gas and electric heaters
- **Chamber Growth Space Evaporators:** Four evaporator's design (two coils in each side wall of the chamber to maximize chamber performance)
- **Light Fixture Evaporators:** Four lamp heat exchangers are provided to dissipate lamp heat (heat exchangers are independent from the chamber growth space evaporators) (an independent temperature controller and valves will keep the lamp bank at the bulbs optimal operating temperature)
- **Condensing Units Location:** Each condensing unit will be placed in a rack which houses both units (one in top of the other [the rack should be place near the chamber])

air flow

- **Air Circulation:** Uniform vertical (upward) airflow
- **Fresh Air:** Adjustable forced air exchange system to provide up to 20 air exchanges per hour of fresh air to the room

temperature control

- **Temperature Range:** 10°-44°C (± 1.0°C) lights on and 4°-44°C (±0.5°C) lights off
- **Temperature Uniformity:** ± 1.0°C within work area on a horizontal plane
  - Adjustable high and low temperature controls, audible alarms, and visual indicators provided
  - Controls shut down all power to the room, activate alarm and automatically control the temperature at the safety value (when the temperature returns to the normal range the system will automatically reset)
  - Dry-alarm contacts are provided for connection to remote alarm monitoring system
- **SENCEAIR:** Sensing device located in the chamber growth area continuously samples chamber air for accurate controlling and recording independent of lamp radiation

accessories

- Two Duplex convenience outlets provided (GFCI)

electrical requirements

- **Chamber Requirements:** 120V/208V/3-phase/60 Hz, 4 wires plus ground
- **Chamber Disconnect Switch:** Electrical lockable disconnect at room will be provided
- **Condensing Unit Requirements:** 208V/3-phase/60 Hz, 3 wires plus ground
- **Condensing Unit Disconnect Switch:** Electrical lockable disconnect near condensing unit will be provided

installation

- Complete product installation performed by qualified, factory trained, installation staff

options (most popular)

- Remote air cooled condensing unit
- Vertical downward airflow (does not include perforated aluminum floor)
- Four doors in lieu of two doors (two on front and two on rear of chamber)
- Dimmable lighting
- Humidification
- Dehumidification
- Additive CO_2
- Touch Screen

PERCIVAL
Percival Scientific, Inc.
505 Research Drive • Perry, IA 50220
800.695.2743 • 515.465.9363 • Fax: 515.465.9464
www.percival-scientific.com