

NOR-LAKE[®] SCIENTIFIC LIGHTED CHAMBERS

PLANT GROWTH, ARABIDOPSIS, TISSUE CULTURE, INCUBATOR, GERMINATION

Designed to meet the demanding requirements for scientific and laboratory research. Advanced engineered design incorporates the latest in cabinet, refrigeration, temperature control and monitoring features. Provides energy efficient, convenient, safe and reliable performance for optimal temperature environments necessary for a wide range of plant science, life science, pharmacy, biological, medical, clinical and industrial applications.

Standard Features:

- Microprocessor controller with 4x20 character LCD digital display control panel with message center
- Programmable temperature control and humidity control (applicable models)
- Five stages of light control
- Air probe with air temperature High/Low alarms
- Remote alarm contacts
- Adjustable temperature control range from +4°C to +44°C
Factory preset at +25°C
- User selectable Metric and English units (°C or °F)
- Door ajar alarm, audible and visual
- Product sensor with glycerin bottle
- Air sensor
- Audible and visual High/Low air and product temperature alarms
- Remote alarm contacts
- 2 to 10 volt DC output for product temperature re-transmit (selectable to air temperature)
- Password protection – set points and factory settings
- 100 event alarm logging with date/time stamp
- Integrated High/Low (reset at midnight) product temperature alarm test
- Temperature sensor calibration
- Real time clock with date and time display
- Door opening counter with 24 hour automatic reset
- Adjustable alarm beep or constant on (key pad selectable)
- Alarm volume adjustable manually
- Loss of power alarm
- Exterior cabinet front, sides and back are painted white
- Exterior cabinet top and bottom are galvanized steel
- Interior cabinet liner and interior door panel are stainless steel
- Cabinet and solid door are foamed-in-place with CFC Free high density polyurethane foam insulation
- Heavy duty door pivot hinges
- Centered key door lock (2 keys)
- Full length door pull handle
- Four casters (2 locking)
- Perimeter anti-condensate door frame (temperature selectable) heater wires
- Cabinet floor drain and plug
- Condensate external drip pan
- Magnetic door gasket
- Air cooled condensing unit
- Top mounted forced air refrigeration system
- Automatic defrost
- Warranties: 18 months parts and labor, 5 year compressor (US and Canada), 18 months parts (International)
- UL/CUL

Optional Features:

- Legs in lieu of casters
- Stainless steel shelf tray
- Stainless steel exterior
- 4-20ma output for product temperature re-transmit (selectable to air temperature)
- RS-485 (MODBUS-RTU) computer interface
- Sensor access port vent 1" diameter
- Temperature chart recorder with paper 1 pen
- Temperature/Humidity chart recorder with paper 2 pen
- Ethernet 10 baseT (HTTP) control monitoring web card
- 2" sleeve with cover
- Internal electrical outlet
- CO₂ control Injection



NSLC331WSW/0ARH
ARABIDOPSIS
CHAMBER

NSLC331WSW/0IN1H
TISSUE CULTURE
CHAMBER



Nor-Lake, Inc.
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File No. 10001816

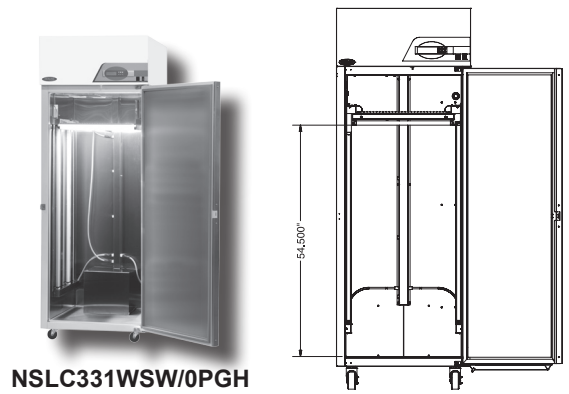
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PLANT GROWTH CHAMBER MODEL NSLC331WSW/0PG

A single tiered configuration accommodating up to 4.7 ft² of working area, and a usable growth height adjustable up to 54-1/2". The removable lamp canopy provides up to 600 μ mole/M²/sec of light, utilizing a custom mixture the latest fluorescent technology. Includes (1) 16 bulb horizontal fixture and 8 vertical bulbs. Air flow is provided by the uniform distribution of air through a ceiling plenum. The plenum delivers conditioned air evenly through out the chamber providing maximum uniformity and efficiency.

Plant Growth Chamber with Humidification - Model NSLC331WSW/0PGH

3.88 ft² of growth area when optional humidity is utilized.

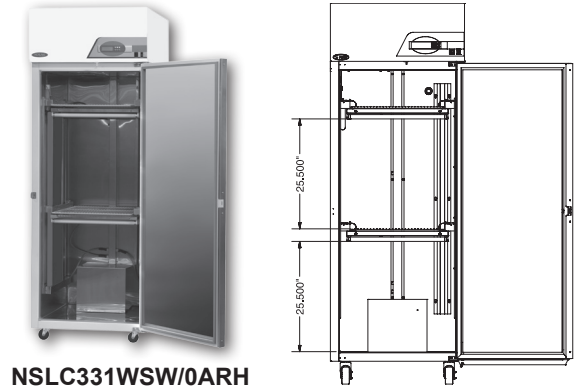


NSLC331WSW/0PGH

ARABIDOPSIS CHAMBER MODEL NSLC331WSW/0AR

A double-tiered configuration accommodating up to 8.64 ft² of working area, and a usable growth height of 25-1/2" per shelf. The removable lamp canopies provide up to 250 μ mole/M²/sec of light, utilizing a custom mixture the latest fluorescent technology. Includes (4) four bulb horizontal fixtures in 2 levels, 2 fixtures on each level. Air flow is provided by the uniform distribution of air through a ceiling plenum. The plenum delivers conditioned air evenly through out the chamber providing maximum uniformity and efficiency.

Arabidopsis Chamber with Humidification - Model NSLC331WSW/0ARH

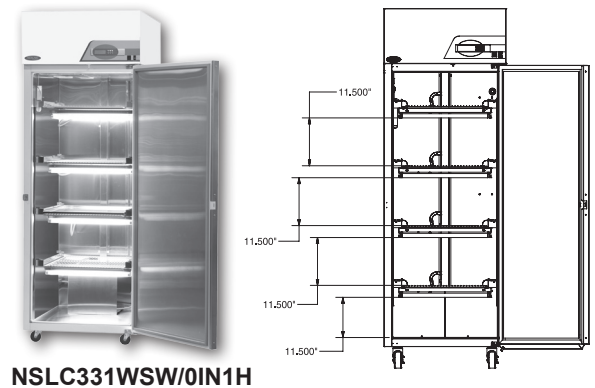


NSLC331WSW/0ARH

TISSUE CULTURE CHAMBER MODEL NSLC331WSW/0IN1

A four-tiered configuration provides up to 15.76 ft² of working area, and a usable growth height of 11.5" per shelf. The removable lamp canopies provide from 45 to 145 μ mole/M²/sec of light, utilizing a custom mixture the latest fluorescent technology. Includes (4) four bulb horizontal fixtures on 4 levels, 1 fixture on each level. Air flow is provided by the uniform distribution of air through a ceiling plenum. The plenum delivers conditioned air evenly through out the chamber providing maximum uniformity and efficiency.

Tissue Culture Chamber with Humidification - Model NSLC331WSW/0IN1H

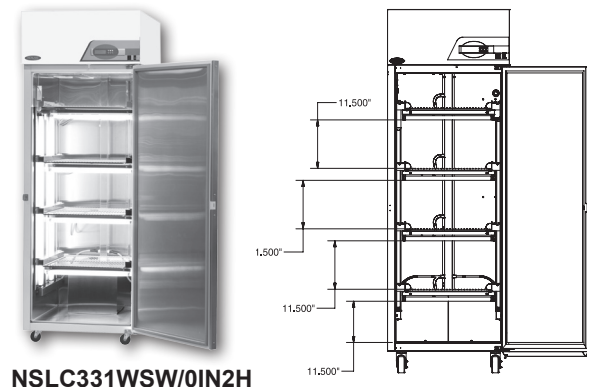


NSLC331WSW/0IN1H

INCUBATOR CHAMBER MODEL NSLC331WSW/0IN2

A four-tiered configuration provides up to 15.76 ft² of working area, and a usable growth height of 11.5" per shelf. The removable lamp canopies provide from 45 to 190 μ mole/M²/sec of light, utilizing a custom mixture the latest fluorescent technology. Includes (4) four bulb horizontal fixtures and 8 verticals in 4 levels. One fixture on each level. Air flow is provided by the uniform distribution of air through a ceiling plenum. The plenum delivers conditioned air evenly through out the chamber providing maximum uniformity and efficiency.

Incubator Chamber with Humidification - Model NSLC331WSW/0IN2H

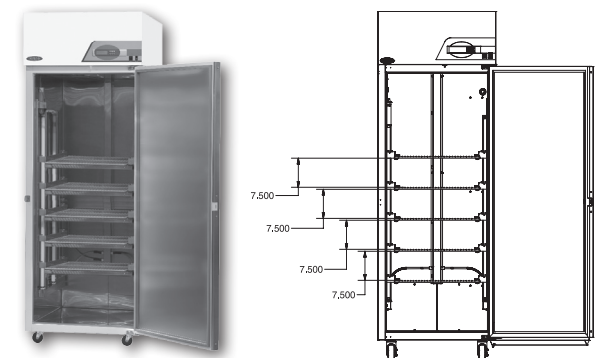


NSLC331WSW/0IN2H

GERMINATOR CHAMBER MODEL NSLC331WSW/0GM

A five-tiered configuration provides up to 19.75 ft² of working area, and a usable growth height of 7-3/8" per shelf. Eight vertical lamps provide 50 μ mole/M²/sec of uniform light. Includes 8 vertical bulbs. Air flow is provided by the uniform distribution of air through a ceiling plenum. The plenum delivers conditioned air evenly through out the chamber providing maximum uniformity and efficiency.

Germinator Chamber with Humidification - Model NSLC331WSW/0GMH



NSLC331WSW/0GM

Note: For all models with humidity (H) suffix reduce usable available internal floor space by 1.4 ft².

Performance:

*Temperature Variation: +/-0.5°C @ 10°C to 44°C with lights on. Temperature Variation: +/-0.5°C @ 4°C to 44°C with lights off. The published temperature variation is derived from the maximum deviation of the thermocouple located nearest the chamber geometric center during the entire test period. (i.e. 25.0°C min and 26.0°C max divided by two would be a variation of +/-0.5°C).

Temperature Uniformity:

*+/-1°C @ 10°C to 44°C with all lights on.

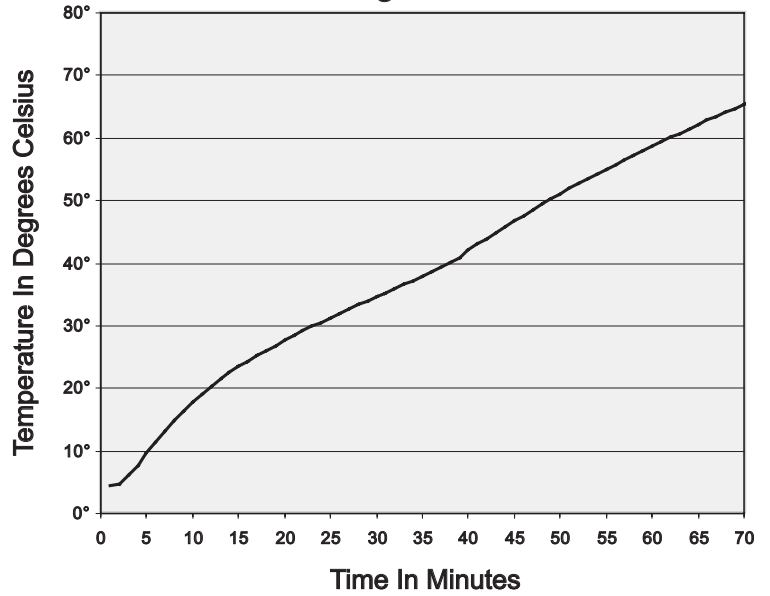
+/-1°C @ 4°C to 44°C with all lights off.

The published temperature uniformity is derived from the maximum deviation of 3 thermocouples placed on a horizontal plane, having the thermocouples evenly spaced diagonally across the shelf from the left and right inner wall, and the middle sensor placed in the approximate geometric center of the shelf.

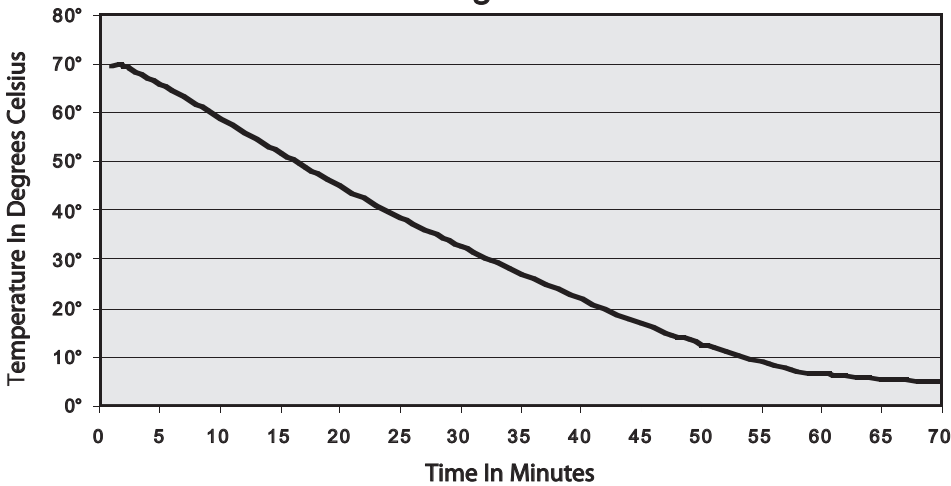
Humidity Variation:

+/-5% @ 5°C to 60°C and RH within performance graph. Humidity variation is derived from the maximum deviation of the humidity sensor during the test period.

**Typical Temperature Rise
Lights Off**



**Typical Temperature Pull Down
Lights Off**



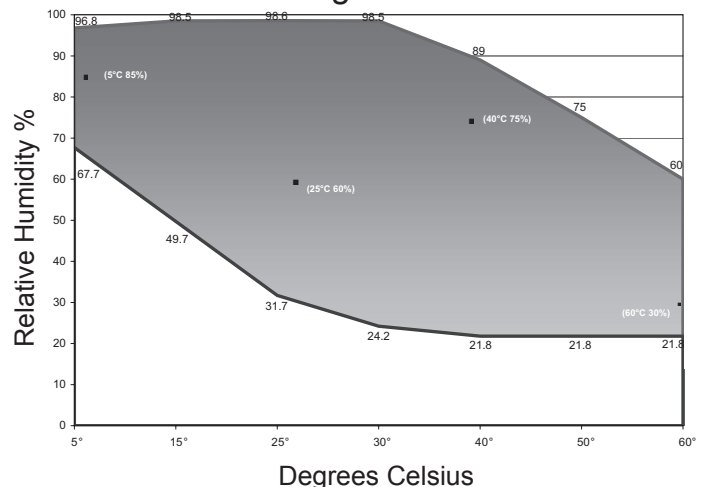
**Performance data is based on 23°C, 50% RH ambient conditions, type T-24 Ga. thermocouples with 1.0oz. brass slugs attached and no product in the chamber. Data may vary if; ambient conditions change, product load is added, or other changes cause interference to chamber airflow.*

Humidification / Dehumidification:

Relative humidity is induced by a highly efficient centrifugal atomizer with a sealed motor and low maintenance reservoir. Dehumidification is achieved by the use of a separate dehumidification latent coil. Both systems are precisely controlled by the programmable logic microprocessor. The humidity controller utilizes a dry capacitance type sensor for rapid response to humidity changes with exceptional accuracy. The humidifier requires a water source with low mineral content; i.e., resistance of 0.05 - 1.0 megohm and a pressure of 10 - 100 psi. Reverse osmosis treated water is recommended. The water supply connection requires 1/4" plastic or copper tubing.

Performance tested in unlighted chamber.

**Typical Temperature/Humidity Operation
Lights Off**



LIGHTED CHAMBER PRODUCT SPECIFICATIONS

NOR-LAKE® SCIENTIFIC MODELS	NSLC331WSW/0PG NSLC331WSW/0PGH	NSLC331WSW/0AR NSLC331WSW/0ARH	NSLC331WSW/0IN1 NSLC331WSW/0IN1H	NSLC331WSW/0IN2 NSLC331WSW/0IN2H	NSLC331WSW/0GM NSLC331WSW/0GMH
	PLANT GROWTH	ARABIDOPSIS	TISSUE CULTURE	INCUBATOR	GERMINATOR
TEMPERATURE RANGE	10° to 44° C	10° to 44° C	10° to 44° C	10° to 44° C	10° to 44° C
LIGHT INTENSITY	600 μ mole/M ² /sec	250 μ mole/M ² /sec	Variable from 45 to 145 μ mole/M ² /sec	Variable from 45 to 190 μ mole/M ² /sec	50 μ mole/M ² /sec
TIERS	1 tier	2 tier	4 tier	4 tier	5 tier
Max Growth/Sample Height Equally Spaced	54 1/2"	25 1/2"	11 1/2"	11 1/2"	7 1/2"
Floor/Shelf Square Feet (Models Without Humidity)*	4.70 ft ²	3.94 ft ² per shelf 4.7 ft ² floor 8.64 total	3.94 ft ² per shelf 15.76 ft ²	3.94 ft ² per shelf 15.76 ft ²	3.94 ft ² per shelf 19.7 ft ²

*Models with humidity (H) suffix reduce usable internal floor space by 1.4 ft²

LIGHT INTENSITY μ mole/M ² /sec actual measured 6" from majority bulb @ 27°C @ 100% WITH SIDE LIGHTS	600 μ mole/M ² /sec			190 μ mole/M ² /sec	50 μ mole/M ² /sec
LIGHT INTENSITY μ mole/M ² /sec actual measured 6" from majority bulb @ 27°C @ 100%	554 μ mole/M ² /sec	250 μ mole/M ² /sec	145 μ mole/M ² /sec	145 μ mole/M ² /sec	
LIGHT INTENSITY μ mole/M ² /sec actual measured 6" from majority bulb @ 27°C @ 75%	450 μ mole/M ² /sec	197 μ mole/M ² /sec	113 μ mole/M ² /sec	113 μ mole/M ² /sec	
LIGHT INTENSITY μ mole/M ² /sec actual measured 6" from majority bulb @ 27°C @ 50%	305 μ mole/M ² /sec	135 μ mole/M ² /sec	79 μ mole/M ² /sec	79 μ mole/M ² /sec	
LIGHT INTENSITY μ mole/M ² /sec actual measured 6" from majority bulb @ 27°C @ 25%	145 μ mole/M ² /sec	60 μ mole/M ² /sec	45 μ mole/M ² /sec	45 μ mole/M ² /sec	

*Note: Light measurement may vary with temperature and bulb age.

CONTROL SYSTEM: A fully programmable microprocessor provides a user interface through a liquid crystal alphanumeric display. All set points are adjustable by one multi-function key pad. The standard control includes: Fully programmable ramp soak functions, product and air temperature read out, alarm logging, system mode heating / cooling indicator, high / low audible / visual alarms, real time clock, power failure alarm, sensor failure alarms, user password entry system.

CONDITIONING SYSTEM: Precision control provided by the uniform distribution of air through a ceiling plenum. The plenum delivers conditioned air evenly through out the chamber providing maximum uniformity and efficiency. A heavy duty refrigeration system provides rapid removal of heat caused by door openings or product load. The system accurately delivers cooling based on demand and modulates to provide precision control. The system utilizes environmentally safe non-toxic CFC free refrigerant, with air-cooled, hermetically sealed compressor backed by a 5 year warranty. The system includes a modulated expansion valve system to optimize capacity and efficiency. Heating is provided by an incoloy tube heater.

CONSTRUCTION: Heavy duty double wall construction. Exterior finish of heavy gauge steel painted with scratch resistant powder coat. Interior finish is stainless steel. Complete cabinet and door are insulated and sealed with 100% UL Class 1 rigid polyurethane foam insulation. The foamed-in-place insulation provides low heat transfer, improved cabinet performance and prohibits moisture from migrating into the cabinet walls. Hardware includes: Heavy duty self closing door hinges, full length stainless steel pull handle, full peripheral high temperature door gasket providing a tight seal. Key lock door and 3" casters for ease of rolling. Complete perimeter anti-condensate door heater wire thermostatically controlled for energy savings.

Voltage Model	Voltage Description	NEMA Plug	NEMA Receptacle
/0	115V, 1PH, 60HZ	5-20P	5-20R



SPECIFICATIONS	
Models without Humidification	NSLC331WSW/0PG NSLC331WSW/0AR NSLC331WSW/0IN1 NSLC331WSW/0IN2 NSLC331WSW/0GM
Models with Humidification	NSLC331WSW/0PGH NSLC331WSW/0ARH NSLC331WSW/0IN1H NSLC331WSW/0IN2H NSLC331WSW/0GMH
Crated Height (in) (cm)	92" (234)
Crated Width (in) (cm)	37" (94)
Crated Depth (in) (cm)	38" (96)
Crated Weight (lbs) (kg)	439 (200)
Interior Height (in) (cm)	67" (170)
Interior Width (in) (cm)	27-3/4" (70)
Interior Depth (in) (cm)	31" (78)
Overall Height (in) (cm)	88-3/8" (224)
Overall Width (in) (cm)	31-3/4" (80)
Overall Depth (in) (cm)	35-7/8" (91)
Gross Cubage (ft. ³) (l)	33.1 (935)
Shelf Area (Per)	up to 15.75 sq. ft.
Number of Casters	4 (2 locking)
Condensing Unit Size	1/3HP
Refrigerant	R-134a
Maximum Fuse Size	20 AMPS
Total Amp Draw	13.6
Voltage	120V, 60HZ

Specifications subject to change without notice.



Nor-Lake, Inc.
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