



## SPECIFICATIONS for NuAire Models NU-5800 thru NU-5841 DH / DHD Invitrocell Direct Heat & Direct Heat Decontamination Automatic CO<sup>2</sup> Incubators

This document is a concise statement of requirements for a quality Direct Heat (DH) and Direct Heat w/heated Decontamination CO<sup>2</sup> (DHD) Incubators, which may be used to augment your purchase.

The following table is a matrix of the Invitrocell model numbers showing the control systems/features available on each model:

Model #	Type	Control Systems / Features					O <sup>2</sup> Sensor Type	
		Temperature	CO <sup>2</sup>	Relative Humidity (RH)	Decontamination	Fuel Cell	Zirconia Ceramic	
NU-5800	DH	X	X					
NU-5810	DHD	X	X		X			
NU-5820	DHD	X	X	X	X			
NU-5831	DHD	X	X		X		X	
NU-5841	DHD	X	X	X	X		X	

A NuAire sales representative will be pleased to explain the importance of the performance and control affected by each of the following requirements. The DH / DHD INVITROCELL models listed in the table above meet all of the requirements in the following specifications that pertain to each of them.

#### Overall Dimensions - Inches [mm]

Exterior:   Height: 39.688 in (1008 mm)  
                   Width: 26.750 in (680 mm)  
                   Depth: 27.188 in (691 mm)

Foot Print:   Width: 23.75 in (603 mm)  
                   Depth: 20.75 in (527 mm)

Interior:     Height: 28.500 in (724 mm)  
                   Width: 21.257 in (540 mm)  
                   Depth: 20.053 in (509 mm)

Volume: 7.06 ft<sup>3</sup> [200 liter]

Weight: 235lbs/106kg

SPECIFICATIONS/FEATURES that apply to all models except as noted:

1. The chamber's walls are directly heated by foil heating elements attached to the sides, bottom, top, back and access port of the chamber.
2. A space-age high-density insulation (rated R5.0) covers the complete outer surfaces of the incubator inner chamber.
3. A HEPA filtration system shall be provided. Closed loop HEPA filter system is designed to minimize contamination at a recirculation rate of 1 chamber volume change every 20 minutes.
4. A state-of-the-art microprocessor based control system is specifically designed to service the precise control requirements of the chamber's environment.
5. The microprocessor is supported with Read Only Memory [ROM] containing executable software, Random Access Memory [RAM] for temporary storage, and Electronically Erasable Programmable Read Only Memory [EEPROM] for control set points and parameters. The EEPROM provides for indefinite storage of these values during periods of power off or power interruption.
6. All of the Direct Heat Models feature the NuTouch Electronic Control System. NuTouch is a user-friendly 5" x 7" color touch screen display in English (default), Spanish, German and French are also selectable. The Screen displays operating control parameters, status indicators and additional key operational parameters. An imbedded touch panel permits efficient operator entry of set points, operating control parameters, access to alternate menus and support systems. The microcomputer is supported with Read Only Memory (ROM) containing executable software, Random Access Memory (RAM) for temporary storage and Electronically Erasable Programmable Read Only Memory (EEPROM) for control set points and parameters. The EEPROM provides for indefinite storage of these values during periods of power off or power interruption (power fault tolerant).
7. All of the direct heat incubator models incorporate an integrated digital microprocessor-based, non-dispersive infrared CO<sup>2</sup> sensor. The single light source dual wave length detection design provides a very stable drift-free output requiring less frequent calibration. The second wave length that the detector reads provides a reference for detecting and automatically adjusting to changes in the light source which extends the length of time that the sensor readings are repeatable.
8. Direct Heat models NU-5820 & NU-5841 incorporate a Relative humidity display & control system that maintains chamber RH levels up to 95% +5%/-3.0%. This is achieved by circulating chamber air through heated water vapor in a water reservoir tank located outside of the chamber. The humidity control system uses a solid-state capacitance humidity sensor to monitor the relative humidity within the chamber. If humidity is required, the control microprocessor will activate a solenoid valve to circulate the chamber air through the water reservoir tank. The relative humidity display and control offers an accurate and reliable method to control humidity when required.
9. Direct Heat model **NU-5831** and **NU-5841** incorporates an Oxygen display and control system utilizing a Zirconia Ceramic type sensor which generates a logarithmic mVDC signal based on O<sup>2</sup> content in the chamber. If nitrogen is required to lower the O<sub>2</sub> level in the chamber the microprocessor activates a solenoid valve that injects nitrogen into the chamber until the O<sub>2</sub> level set point is achieved. This is a high accuracy sensor for higher demand oxygen control applications including hypoxic work.
10. Incubator shall be listed by Underwriters Laboratory to meet the requirements of both the U.S. and Canada standards for electrical/mechanical integrity.
11. The outer shell is cold-rolled steel with powder coat paint finish.
12. Offered with the choice of the chamber and shelves constructed of type 304L Stainless Steel or Copper.  
The combination of choices of chambers and shelves are:
  - A. Stainless Steel Chamber with Stainless Steel Shelves
  - B. Stainless Steel Chamber with Copper Shelves
  - C. Copper Chamber with Copper Shelves

13. All shelves, shelf supports, & guide rails, are easily removable for cleaning.
14. Manually adjustable outer front door heater and front frame perimeter heater are duty cycle controlled for the full range of chamber temperature set-points. They are manually adjustable from -20% to +20% to control condensation within the chamber. The heaters are microprocessor controlled to change output in a varying room ambient to avoid an overheating condition. The heater output can change back to the set value automatically as the room temperature stabilizes.
15. Relative humidity level up to 95% is achieved in the incubator by the use of a stainless steel pan filled with single distilled water no purer than 1 mega ohm and placed on the bottom of the chamber.
16. A microprocessor controlled air pump and solenoid valve injects air at user settable intervals to control condensation.
17. The incubator is programmed with options that give the user control of System use, calibration procedures, alarm parameters, & adaptation to different lab environments.
18. Incubator comes standard with four [4] rectangular polished stainless steel shelves, 8 ft. [2.5m] electrical power cord, utility side access port, and heavy-duty leg levelers.
19. Incubators are stackable.
20. Field Reversible door hinges.
21. The following communication systems are standard to support installation and user requirements:
  - A. RJ-45 Jack - RS-485 2 way Communication
    - Output: Control system levels and alarms/events
    - Input: Commands from a PC to check & change Set Points/Operating parameters and get live control system readings
  - B. RJ-45 Jack - 4-20 mA Analog output for monitoring all active control system levels
  - C. RJ-11 Jack - on rear panel for remote alarm connection performances
  - D. USB Port Jack
    - Used to down load Performance & event history
    - Plus upload new revisions of programming for both the control board and the NuTouch display.
22. Heated Decontamination / Sterilization cycles  
Available on Models: **NU-5810, NU-5820, NU-5831 and NU-5841.**
  - A. 95°C Humidified Decontamination
    - < 14 Hours (Start to Finish)
  - B. 145°C Dry Sterilization Cycle
    - < 10 Hours (Start to Finish)

23. Performance Parameters

Temperature Control Standard on all models:	
Control Range:	5° C above ambient (to a 30°C max ambient) to 55°C
Set-Point Range:	5° C to 55°C (37.0 Default)
Uniformity:	± 0.35° C @ 37° C
Accuracy:	± 0.1° C
Recovery:	0.12° C/min. on Average
Display Resolution:	0.1° C
Door and Perimeter Heater	
Control Logic:	Base Duty Cycle set to chamber temperature
	Set-Point
	Proportional 0-100% [manually adjustable]
Temperature Sensor Type:	Precision Integrated Circuit
<b>CO2 Control Standard on all models</b>	
Range:	0.1 to 20% 5% Default Set Point
Accuracy:	± 0.1%
CO <sup>2</sup> Recovery:	Up to 5% ± 0.2% / -0.5 in 5 minutes Average
CO <sup>2</sup> Display Resolution:	0.1%
CO <sup>2</sup> Control Logic:	Fixed Algorithm/Manual
	Environmental Adaptable
CO <sup>2</sup> Sensor Type:	Infrared (NDIR)

Relative Humidity Display & Control Available on Models NU-5820 and NU-5841	
Control Range:	Ambient dependent to 95%
Accuracy:	+5% /- 3%
Recovery:	90% +5%/-3% within 25 minutes on average
Display Resolution:	0.1%
RH Control Logic:	Fixed algorithm/ manual environmental adaptable
RH Sensor Type:	Precision capacitance bulk-polymer.
<b>Zirconia Ceramic Type Sensor Oxygen display and Control System available on models NU-5831 and NU-5841</b>	
The oxygen sensor shall be a Zirconia ceramic type sensor, which generates a logarithmic mVDC signal based on O <sup>2</sup> content in the chamber	
Range:	0.5 -21.0% (ambient) (21.0% Default) (2-21.0% when RH setpoint is above 90%)
Accuracy:	±0.25%
O <sub>2</sub> Sensor Type:	Zirconia Ceramic
Display Resolution:	0.1%
O <sub>2</sub> Control Logic:	Fixed algorithm/ manual environmental adaptable
Recovery:	5.0 ± 0.5% twenty minutes on Average

24. The following optional equipment shall be available to support installation and user requirements for all models:

- Additional Shelves
- Surge Protector
- Platform w/Combination Castor/Leg Levelers
- External Tank Switch
- Gas Tight sectioned inner door
- Moisture Proof Duplex
- Two Stage Regulators for CO<sub>2</sub> and N<sub>2</sub> gas supplies
- Stacking Rack