SPECIFICATIONS for NuAire Models NU-8600 and NU-8631
WJ Invitrocell
Water Jacket Automatic CO^2 Incubators

This document is a concise statement of requirements for a quality Water Jacketed CO^2 (WJ) 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		
		Temperature	CO_2	O_2 Sensor
NU-8600	WJ	X	X	
NU-8631	WJ	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 Water Jacketed 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:	37.75 inches	958mm
	Width:	25.625 inches	649mm
	Depth:	27 inches	685mm
Foot Print:	Width:	22 inches	557mm
	Depth:	17.5 inches	445mm
Interior:	Height:	24 inches	611mm
	Width:	20.375 inches	518mm
	Depth:	20.625 inches	524mm
Volume:		5.65 ft^3	160 liter
Weight: (with water & shelves)		403 lbs.	183kg

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

1. The outer shell is constructed of 16 gauge, type 304 stainless steel with painted finish.

2. The inner chamber is 16 gauge, type 304-polished stainless steel using coved corner crevice-free construction.

3. The outer chamber's walls are lined with a closed cell insulation providing a R.5 rating, minimizing heat loss.

4. The large water-jacket (18 gallon or 68.1 liters) surrounding the inner chamber permits the water to circulate within the jacket, producing a temperature uniformity of $\pm$ 0.2° C.

5. A water fill port shall be provided on front of the chamber with a 1/4" NPT opening for a 3/8" tubing connection.
   An over fill port on front of chamber will assure optimal water levels.
   A low water level warning system is activated if water levels fall below proper operating conditions.

6. A drain valve is located on bottom front of chamber for complete drainage of the water jacket.

7. 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 30 minutes.

8. A state-of-the-art microprocessor based control system is specifically designed to service the precise control requirements of the chamber's environment.

9. 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.

10. All of the Water Jacket 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).

11. All of the Water Jacket incubator models incorporate an integrated digital microprocessor-based, non-dispersive infrared CO^2 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.

12. Water Jacket model NU-8631 incorporates an Oxygen display and control system utilizing a Zirconia Ceramic type sensor which generates a logarithmic mVDC signal based on O^2 content in the chamber. If nitrogen is required to lower the O_2 level in the chamber the microprocessor activates a solenoid valve that injects nitrogen into the chamber until the O_2 level set point is achieved. This is a high accuracy sensor for higher demand oxygen control applications including hypoxic work.

13. Incubator shall be listed by Underwriters Laboratory to meet the requirements of both the U.S. and Canada standards for electrical/mechanical integrity.

14. Offered with the choice of shelves constructed of type 304L Stainless Steel or Copper. The combinations of choices of shelves are:
    A. Stainless Steel Chamber with Stainless Steel Shelves
    B. Stainless Steel Chamber with Copper Shelves

15. All shelves, shelf supports, & guide rails, are easily removable for cleaning.

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16. Manually adjustable outer front door heater is duty cycle controlled for the full range of chamber temperature set-points. They are manually adjustable from -20% to 20% to reduce condensation within the chamber. The heaters are microprocessor controlled to adjust to a varying room ambient temperature.

17. 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.

18. A microprocessor controlled air pump and solenoid valve injects air at user settable intervals to control condensation.

19. The incubator is programmed with options that give the user control of System use, calibration procedures, alarm parameters, & adaptation to different lab environments.

20. Incubator comes standard with four [4] rectangular polished stainless steel shelves, an 8 ft. [2.5m] electrical power cord, utility side access port, and heavy-duty leg levelers.

21. Incubators are stackable.

22. Field Reversible door hinges.

23. 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.

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24. 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:	± 0.20° 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
CO2 Control Standard on all models	
Range:	0.1 to 20% with 5% Default Set Point
Accuracy:	± 0.1%
CO^2 Recovery:	Up to 5% ± 0.2% / -0.5 in 5 minutes Average
CO^2 Display Resolution:	0.1%
CO^2 Control Logic:	Fixed Algorithm/Manual and Environmental Adaptable
CO^2 Sensor Type:	Infrared (NDIR)
Zirconia Ceramic Type Sensor Oxygen display and Control System available on model **NU-8631**	
The oxygen sensor shall be a Zirconia ceramic type sensor, which generates a logarithmic mVDC signal based on O^2 content in the chamber	
Range:	0.5 -21.0% (ambient) (21.0% Default)
Accuracy:	±0.25%
O_2 Sensor Type:	Zirconia Ceramic
Display Resolution:	0.1%
O_2 Control Logic:	Fixed algorithm/manual environmental adaptable
Recovery:	5.0 ± 0.5% twenty minutes on Average

25. 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 CO2 and N2 gas supplies
    - Stacking Rack

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