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Controlled Environment Equipment Solutions for the Lab



Forma® Series II Water Jacketed CO_2 Incubators

Analyze • Detect • Measure • Control™

Thermo
ELECTRON CORPORATION

#1 Incubator

#1 Selling CO_2 Incubator in the World

The Forma Series II Water Jacketed CO_2 Incubator with precise CO_2 and O_2 control, elevated RH, and a choice of T/C (thermal conductivity) or IR (infrared) sensor is the first choice for many researchers in academic, government, clinical, biotech, and R&D labs. What sets this CO_2 incubator apart from others?

Complete contamination control. We minimize the risk of product loss, downtime, and wasted time and money due to airborne contamination. Chamber design ensures easy cleaning. Carefully directed airflow promotes uniformity, keeping cells at their optimum growth temperature. Validatable 100% HEPA filtration provides Rapid Response Class 100 air quality.* An optional built-in HEPA$^{2™}$ VOC Filtration System removes potentially toxic volatile compounds often found in lab settings.

Security of proven water jacket technology. Think of it as a security blanket. Should the power go out or the ambient temperature swing, the Series II's triple wall construction holds the temperature better than an air jacket or double wall water jacket design.

Easy to configure and use. Setup is simple. The design enhances usability. Enviro-Scan® controls are powerful, intuitive, and common to other Forma named products. Filters are easy to access. An array of accessories is available (e.g., gas guards, roller base, copper components) to tailor each incubator to your needs.

So, whether you are culturing delicate structural mammalian cells in the cleanest possible growth environment, are in human IVF suppressing O_2 and VOC levels, or are focusing on fish or insect cell culture and need precise temperature control near ambient—make the Forma Series II Water Jacketed CO_2 Incubator from Thermo Electron Corporation your first choice.



U.S. Patents 5,792,427 and 6,117,687; U.S. Patent Des. 387,164
*Third party tested/independently verified. Test results and testing protocol are available upon request.

SPACE SAVING CONFIGURATIONS

- Roomy 6.5 cu. ft. single chamber (FDA 510(k) No. K991408)
- Two stacked chambers (stacking hardware included with each)
- Side-by-side
- Field reversible door swing (left hand door swing is standard, as shown)

Complete Contamination Control

The Series II's contamination control features create a safe environment for your critical cultures. The incubator is easy to keep clean. 100% HEPA filtration quickly achieves Class 100 air quality. An optional built-in VOC filtration system removes volatile organic compounds (vapors).

Designed for Easy Cleaning



- Polished stainless steel interior with 100% coved corners is easy to clean, **saving time and reducing contamination risk**.
- **HEPA filter** is located inside the incubator chamber for **optimum filtering, easy access, and simple replacement** (no tools needed). Built-in preventive maintenance system with adjustable timer notifies you when to replace the filter.
- Disposable snap-fit blower/scroll mounting can be **removed easily without tools** for cleaning or replacement.



- Patented inner door gasket is **removable and cleanable**, and adjusts continually to ensure a tight seal.

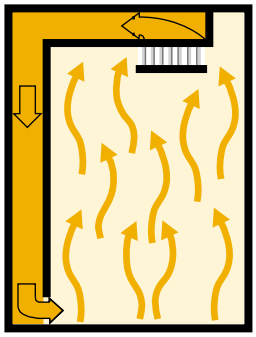


- Sturdy stainless steel shelves and supports can be removed without tools for **easy cleaning or adjustment**.

Rapid Response Class 100

Product yields and reliability can be affected by airborne contamination, costing you time and money. Class 100 air quality contributes to an ideal culturing environment.

Our **Series II Water Jacketed CO_2 Incubator features validatable Class 100 air quality**. Particulates are reduced to cleanroom levels, minimizing the risk of product loss and downtime.



The patented HEPA Filter Airflow System

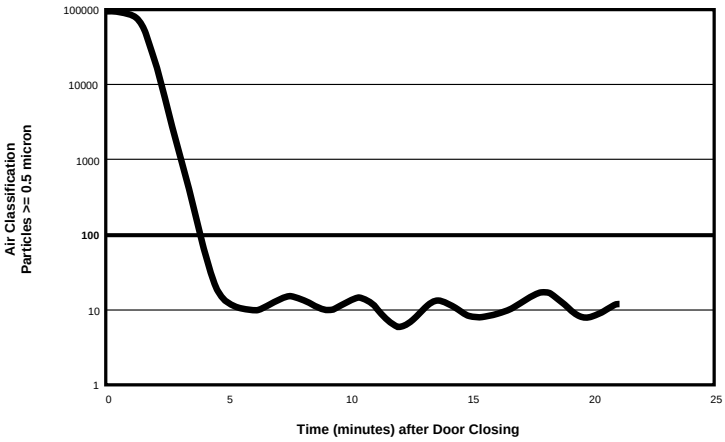
- continuously filters the entire chamber volume every minute to provide an **aseptic culturing atmosphere**

- **filters out primary sources of contamination** (airborne biological particulates) found in most lab settings
- **does not interfere** with your product or the incubator's functioning
- ensures that **Class 100 air quality is achieved within five minutes of the door closing;** slower filtering systems don't provide added protection, they give contaminants an opportunity to settle on surfaces and take hold

The HEPA filter **entraps particulate air contaminants and prevents their escape**. Filter efficiency increases as particulates and micro-organisms are entrapped.

Efficiency and long-term effectiveness of the HEPA Filter Airflow System **minimize the need to remove your product for frequent, lengthy decontamination cycles**. **Incubator down time is diminished**.

To learn more, request the *Importance of Class 100 Air in a CO_2 Incubator* white paper, or visit www.thermo.com/forma.



AIR QUALITY DEFINED

Federal Standard 209E and International Standard ISO 14644-1 define air quality classifications (e.g., Class 1, 10, 100 and ISO Class 1, 2, etc.).

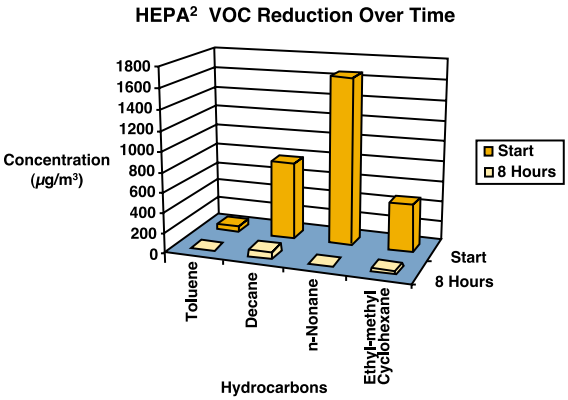
The Federal class number is the maximum allowable number of particles 0.5 microns and larger per cubic foot of air. ISO Class 2 correlates most closely to Federal Standard Class 100.

Cost-Effective HEPA² VOC Filtration

Our optional HEPA² VOC Filtration System (patent pending) helps improve the viability and growth of sensitive cell lines or types by **reducing levels of airborne particulates, biological contaminants, and volatile organic compounds (VOCs)**. The HEPA² filter (No. 760199) complements our proven Class 100 HEPA airflow technology.

We're the **only manufacturer offering a water jacketed CO_2 incubator with built-in VOC removal**. The HEPA² filter's molecular sieve media captures vapors of potentially toxic chemicals commonly used in products such as lab solvents, cleaning agents, plastics, and personal care products.

Examples of chemicals/vapors filtered include alcohols (ethanol and methanol), alkanes (decanes, heptanes, hexanes), aromatics (toluene, xylene, benzene, styrene), and olefins (cyclohexane).



This **easy-to-install, low maintenance** filtration system is **more efficient and longer lasting than activated charcoal systems in high humidity conditions**, such as in a CO_2 incubator.

Would you like to learn more about HEPA²? Request the *Contamination Control and the IVF Incubator* white paper, or visit www.thermo.com/forma.

Proven Water Jacket Technology

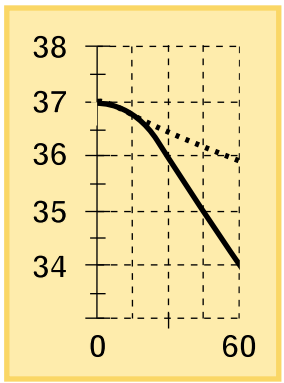
Temperature retention and quick recovery are especially important for researchers working with critical cell cultures. Our water jacketed incubator provides **maximum thermal protection and quick recovery** from swings in ambient temperature and power variations.

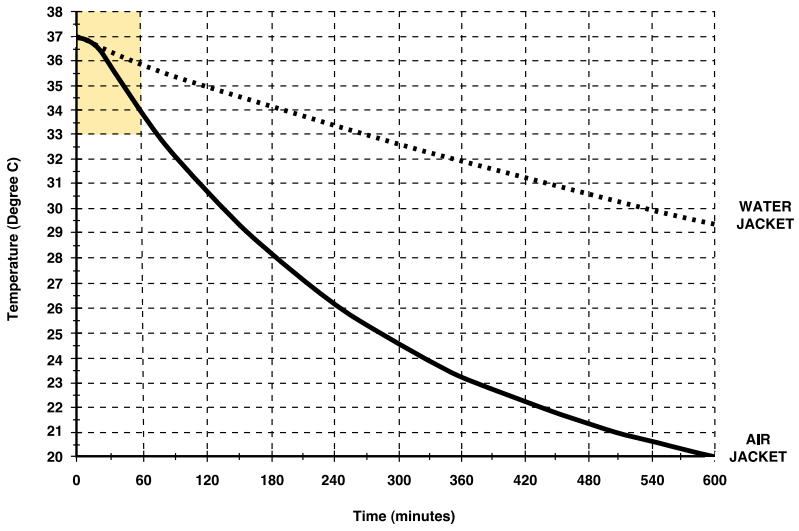
- Durable cabinet's triple wall construction ensures optimum uniformity. The Series II Incubator **holds the temperature longer and recovers to a uniform interior temperature more quickly** than an air jacketed incubator or water jacket with double wall construction.
- Patented, heated, dual pane inner glass door is more responsive than a standard heated outer door, minimizing condensation and enabling **faster temperature recovery**.

Do You Trust Your Power Supply?

Power outages can be detrimental to your cultures. If you aren't completely confident in your power supply, consider the security of a Series II Incubator.

- Product testing during a power failure in an 18C (64.4F) ambient resulted in the **water jacketed incubator's temperature gradually dropping only 1C—from 37C to 36C (98.6F to 96.8F)—in 1 hour** and approximately 7.6C in 10 hours.
- The **air jacketed incubator's temperature dropped 3C—from 37C to 34C (98.6F to 93.2F)—in 1 hour** and 17C in 10 hours.

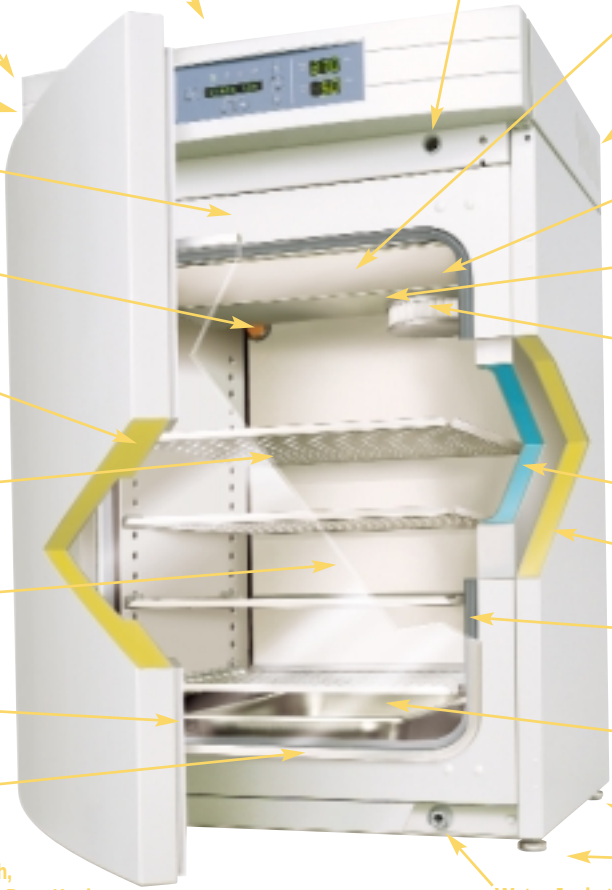




Series II Water Jacketed Incubator versus air jacketed incubator during a power failure

Easy to Configure and Use

Quality construction. Reliable performance. Intuitive controls shared by other products with the Forma name. The Series II Incubator is designed for long life and ease of use.



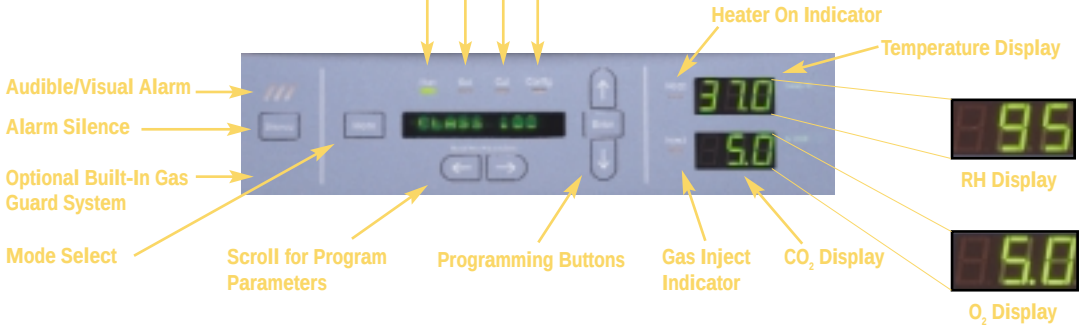
Not shown: Inner Door Switch, Ergonomically Designed Inner Door Knob, and Optional Lock for Inner Door

Setpoint – Set Temp, Overtemp, CO_2, O_2

Run – CLASS 100 timing reminder appears after door is closed for five minutes, message changes to describe alarm conditions

Calibration – Calibrate Temp, CO_2, O_2, RH

System Configuration – Configure Audible On/Off, Access Code, HEPA Filter Change Reminder, RS-485 Interface, Automatic Tank Selector, Audible/Visual Alarms, Display Temp/RH (selectable), Display CO_2/O_2 (selectable)



Specifications

Temperature
Control . . . . . ±0.1C
Range. . . . . 5C above ambient to 55C (131F)*
Uniformity . . . . . ±0.2C @ 37C (98.6F)
Tracking Alarm . . . . . User-programmable high/low

Temperature Safety
Sensor . . . . . Precision thermistor
Controller . . . . . Independent analog electronic
Setability 0.1C

CO_2/O_2
CO_2/O_2 Control . . . . . Better than ±0.1%
CO_2 Range 0-20%
O_2 Range 1-20%
Inlet Pressure . . . . . 15 PSIG (1.0 bar)
CO_2 Sensor. . . . . T/C or IR
O_2 Sensor . . . . . Fuel cell
Readability & Setability. . 0.1%
Tracking Alarm . . . . . User-programmable high/low

Humidity
RH . . . . . Ambient to 95% @ 37C (98.6F)
Humidity Pan . . . . . 3.2 qt. (3.0 liters) standard
Display (opt.) . . . . . In 1% increments

Fittings
Fill Port. . . . . 3/8" hose (barbed)
Drain Port . . . . . 1/4" hose (barbed)
Access Port . . . . . 1.3" (3.3cm) with removable silicone plug with filter
CO_2 Inlet. . . . . 1/4" hose (barbed)

Unit Heat Load
115V/230V . . . . . 344 BTUH (100 Watt)

Shelves
Dimensions . . . . . 18.5" x 18.5" (47.0cm x 47.0cm)
Construction. . . . . Stainless steel, perforated
Surface Area. . . . . 2.4 sq. ft. (0.2 sq. m)

Shelves (continued)
Max. per Chamber . . . . 40.8 sq. ft. (3.8 sq. m)
Standard, Maximum . . . 4, 17

Construction
Water Jacket Volume . . 11.7 gal. (43.5 liters)
Interior Volume. . . . . 6.5 cu. ft. (184.1 liters)
Interior . . . . . Type 304, mirror finish, stainless steel
Exterior. . . . . 18 gauge, cold-rolled steel, powder coated
Outer Door Gasket . . . . Four-sided, molded, magnetic vinyl
Inner Door Gasket . . . . Removable, cleanable, feather-edged, silicone

Electrical
3110/3120/3130/3140 . . 115V, 50/60 Hz, 3.6 FLA (Operating range 90-125V)
3111/3121/3131/3141 . . 230V, 50/60 Hz, 2.0 FLA (Operating range 180-250V)
Circuit Breaker/ Power Switch . . . . . 6 Amps/2 Pole
Convenience Receptacle. . . . . 75 Watts max. (one per chamber)
Plug . . . . . 115V: NEMA 5-15P Plug
230V: CEE 7/7 Plug
Alarm Contacts. . . . . Power interruption; deviation of temp, CO_2, O_2, RH; customer connections through jack on back of unit
Data Outputs (opt.). . . . RS-485, 0-1V, 0-5V, 4-20 milliamp (select one)

Dimensions
Exterior. . . . . 26.0"W x 39.5"H x 25.0"F-B (66.0cm x 100.3cm x 63.5cm)
Interior . . . . . 21.3"W x 26.8"H x 20.0"F-B (54.1cm x 68.1cm x 50.8cm)

Weight
Net. . . . . 265 lbs. (120.2 kg)
Net Operational . . . . . 365 lbs. (165.6 kg)
Shipping (Motor). . . . . 324 lbs. (147.0 kg)

All units are UL Listed to United States and Canadian requirements and bear the CE Mark.
**50C (122F) on Model 3120 (3121), 45C (113F) on Models 3130 (3131) and 3140 (3141)*

Model	CO_2	O_2	Voltage
3110	T/C	No	115
3111	T/C	No	230
3120	IR	No	115
3121	IR	No	230
3130	T/C	Yes	115
3131	T/C	Yes	230
3140	IR	Yes	115
3141	IR	Yes	230

Choice of T/C or IR Sensor

Select a T/C sensor when chamber temp and RH are relatively constant. Typically, a T/C sensor has a longer life than an IR sensor.

Select an IR sensor when temp and RH levels are changed frequently.

With either sensor, elevated RH is critical to prevent desiccation.

Accessories

Accessories are **customer installed unless indicated otherwise**. In addition to providing a standard line of equipment and accessories, we will manufacture custom accessories to meet your specific requirements. Contact us for details.

RH Display

Stock No.	Description
190643	Humidity (RH) Display, readable in 1% increments, includes low RH programmable alarm (alerts you of need to add water to humidity pan), factory installed

Shelving, Ductwork, and Humidity Pan

Stock No.	Description
190884	Stainless Steel Shelf and Channels
	Solid Copper Components –
190656	Solid Copper Interior Ductwork (in place of stainless steel components); includes copper interior ductwork, four shelves, and humidity pan; factory installed at time of order
1900057	Copper Interior Ductwork
190879	Copper Perforated Shelf with Channels
237020	Copper Humidity Pan



Filters* and Decontamination Kit

Stock No.	Description
760175	Replacement HEPA Filter
760209	HEPA Value Pack (4 filters)
760210	10 Disposable Polypropylene In-Line Filters
1900067	HEPA Filter Replacement Kit, includes HEPA, inline, and access port filters
760200	Replacement HEPA^2 VOC Filter
1900094	HEPA^2 VOC Filter Replacement Kit, includes HEPA^2, in-line and access port filters
760199	HEPA^2 VOC Filtration System (kit), converts HEPA Filter Airflow System to HEPA^2 Filtration System, includes HEPA^2 filter and two silicone plugs
190651	Decontamination Kit, includes sample port, HEPA filters, sensor gasket, wheel, and miscellaneous components



Door Kit, Lock, and Right Hand Door Swing

Stock No.	Description
190650	Independent Inner Glass Door Kit (eight glass doors with latches), mounts inside heated inner glass door, is removable and can be autoclaved
190646	Door Lock for Heated Inner Glass Door
190666	Right Hand Door Swing, factory installed at time of order



CO_2 and N_2 Accessories

Stock No.	Description
	Built-In Gas Guards to monitor CO_2 or N_2, automatically switch from one cylinder to the other when supply is exhausted, factory installed –
190640	CO_2 Gas Guard
190642	N_2 Gas Guard
	Regulators with barbed connection and shut off valve –
965010	Two-Stage CO_2 Gas Regulator
961027	Two-Stage N_2 Gas Regulator
950316	Wall Clamp for a CO_2 Bottle, includes cylinder holder with web strap



Roller Base and Stand

Stock No.	Description
190647	Roller Base (heavy-duty steel) with dual-wheel, swivel locking casters and leveling feet; pre-drilled for easy attachment; raises unit 2.8" (7.1cm) off the floor
190648	Stand (heavy-duty steel) with leveling feet, raises unit 6.5" (16.5cm) off the floor



(continued)

**HEPA and HEPA^2 filters are rated a minimum 99.97% efficient at 0.3 microns. Filters are easily replaced without tools.*

Data Outputs (select one), factory installed

Stock No.	Description
190523	RS-485 interface
190512	4-20 milliamp
190543	0-5V analog
190544	0-1V analog

Monitoring and Alarm Systems

Stock No.	Description
1535	Monitor/Alarm System, interfaces with as many as 24 products (channels) to monitor and display equipment conditions up to 2,000 ft. away
	Sensaphone® Telephone Dialing Systems, interface with standard touch-tone phone system –
400047	For up to four input channels
400134	For up to eight input channels
201904	Datalogger, -50C to 140C (-58F to 284F), meets U.S. FDA guidelines: cGLP 21 CFR Part 58, Software Validation 21 CFR Part 820, and Electronic Records 21 CFR Part 11; evaluation software with cable (No. 201910) is available
	6", 7 Day Circular Chart Recorders –
201155	Single pen, 120V
201156	Single pen, 220V
201157	Dual pen, 120V, 2 probes, temp/temp (for stacked incubators)
201158	Dual pen, 220V, 2 probes, temp/temp (for stacked incubators)
201159	Dual pen, 120V, 1 probe, temp/RH
201160	Dual pen, 220V, 1 probe, temp/RH

Miscellaneous Accessories

Stock No.	Description
190043	Sealed Modular Incubator Chamber, purge with any gas mixture to create a "mini-incubator" inside your incubator for unusual gas and temperature controlled experiments, dimensions: 12.0" (30.5cm) circular chamber, 4.7" (11.9cm) high



190645	Chamber Cooling Coil, use with refrigerated water bath/circulator to operate incubator at lower than ambient temperatures, factory installed
290083	Replacement O_2 Sensor
6013110	IQ/OQ, MS Windows®-compatible document disk for process customization and detailed checklists to qualify unit setup and operation

Warranty

Series II Water Jacketed CO_2 Incubators are backed by a full one year parts and labor warranty. The T/C CO_2 sensor is covered by a five year warranty. The IR CO_2 sensor is covered by a two year warranty. The O_2 fuel sensor is covered by a one year warranty. **Construction and integrity of the water jacket chamber are covered by a lifetime warranty.** We're the **only manufacturer in the world to offer this complete coverage for water jacketed incubators**. Contact us for details.

About Thermo

A world leader in high-tech instruments, Thermo Electron Corporation helps life science, laboratory, and industrial customers advance scientific knowledge, enable drug discovery, improve manufacturing processes, and protect people and the environment with instruments, scientific equipment, and integrated software solutions.

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