**Thermo Scientific Forma® Series II
Water Jacketed CO$_2$ Incubators**

**Proven water jacket
technology**

Thermo

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Thermo Scientific Forma Series II Water Jacketed CO_2 Incubators – # 1 Selling incubators worldwide

Thermo Scientific Forma Series II Water Jacketed CO_2 Incubators combine precise CO_2 control with a choice of TC or IR sensors, unsurpassed temperature stability, and superior parameter recovery characteristics, with innovative continuous contamination control technology. No wonder they are the first choice of researchers in academic, clinical, biotech and R&D labs around the world!

- **Security of Proven Water Jacket Technology** – maximum thermal stability and quick recovery are assured with our unique triple wall construction, providing superior protection against temperature loss in the event of an unexpected power outage.

- **Total Contamination Control** minimizes the risk of airborne contaminants entering the incubator upon door openings, with a validatable in-chamber HEPA air filtration system, maintaining your cultures in cleanroom-like Class 100 air quality conditions.

- **Adaptable to Your Specific Requirements** configure the roomy 6.5 cu.ft capacity Series II, to your specific needs and work environment, with a choice of CO_2 sensors, reversible door swings and a host of options including available oxygen control, relative humidity monitoring, antimicrobial copper interiors, datalogging and IQ/OQ documentation kits.

◄ The Series II Water Jacketed Incubators are readily stackable to preserve floor space (hardware included as standard)

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.

Complete Contamination Control –
Minimized Risk of Product Loss and Downtime

Designed for Easy Cleaning

• Polished stainless steel interior with 100% coved corners is easy to clean, saving time and reducing contamination risk.

• Sturdy stainless steel shelves and supports can be readily removed without tools for easy cleaning, autoclaving or adjustment

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

• Snap fit in-chamber HEPA filter can be easily removed without tools, as needed. The Series II messaging center display informs you when the HEPA should be replaced.

100 % HEPA filtration for rapid response class 100 air quality

• The patented in-chamber HEPA air filtration system, continuously filters the entire chamber volume every 60 seconds, reducing particulates to Class 100 cleanroom levels, to preserve your aseptic culturing environment.

• The HEPA filter entraps particulate air contaminants and prevents their escape. Airborne contaminants are the primary source of contamination in most cell culture lab settings. Efficiency and long term effectiveness of the HEPA filter Airflow System protect your cultures and minimize downtime.

• Optimized air flow system design will not interfere with samples or incubator function.

• Class 100 air quality conditions are achieved within 5 minutes following a routine door opening.
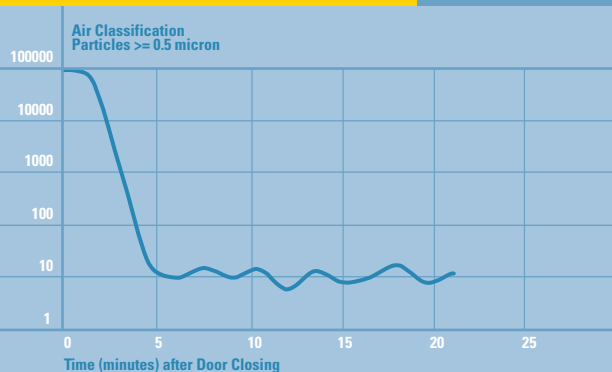
• *Volatile Organic Compounds (VOC) filtration system*
An optional built-in VOC filtration system removes volatile organic vapors which could pose risk to sensitive cultures. Its molecular sieve technology captures potentially toxic chemicals commonly found in products such as lab solvents, cleaning agents and plastics, which may find their way into the incubator.

• This easily installed, low maintenance filtration system is more effective and longer lasting than activated charcoal systems in high humidity conditions, such as in a CO_2 incubator.

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

Sturdy stainless steel shelves and supports can be removed without tools for easy cleaning or adjustment
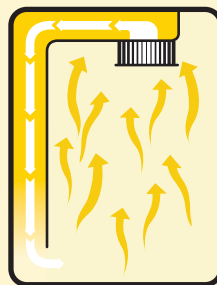
◀ The patented HEPA Filter Airflow System continuously filters the entire chamber volume every minute to provide an aseptic culturing atmosphere

**Air Classification
Particles >= 0.5 micron**

100000
10000
1000
100
10
1

0   5   10   15   20   25

Time (minutes) after Door Closing

◀ **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.

To find out more about the performance of our Class 100 HEPA contamination control system, please visit us at www.thermo.com/incubators

Thermo Scientific Forma Series II Water Jacketed CO_2 Incubators

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 triple wall cabinet construction ensures optimal temperature uniformity. The Series II water jacketed holds temperature longer and recovers to a uniform interior value more quickly than any other technology available today.

- Patented, heated dual pane inner glass door minimizes bothersome condensation with improved responsiveness and 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 18°C (64.4F) ambient resulted in the water jacketed incubator's temperature gradually dropping only 1°C – from 37°C to 36°C (98.6F to 96.8F) – in 1 hour and approximately 7.6°C in 10 hours.

- The air jacketed incubator's temperature dropped 3°C – from 37°C to 34°C (98.6F to 93.2F) – in 1 hour and 17°C in 10 hours.

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.
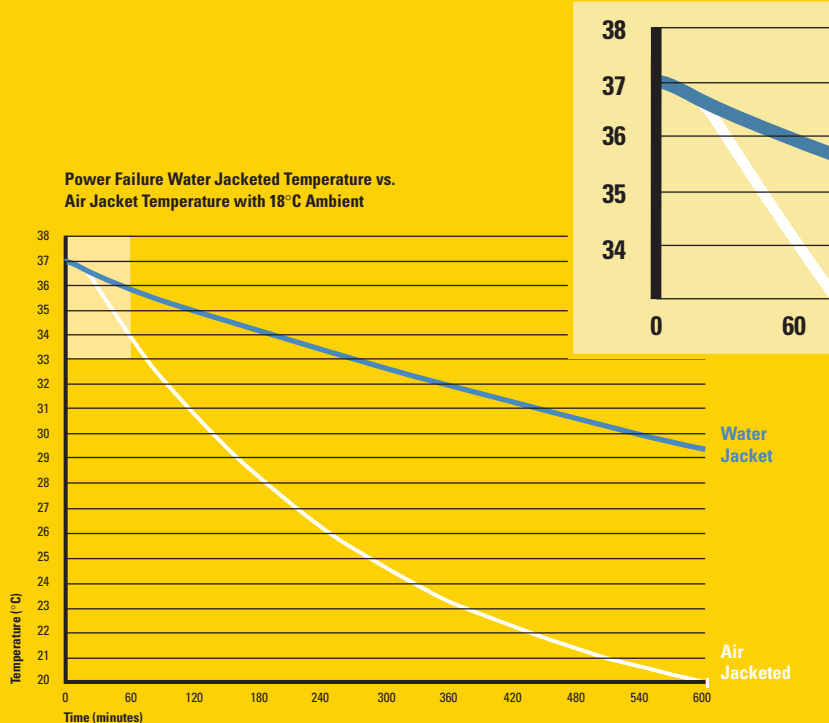
Control O_2 Within the Culture Environment researchers seeking to experiment with the effect of suppressed oxygen concentration upon their cultures can select a Series II model with both CO_2 and O_2 control capabilities. Individual O_2 display facilitates set point and monitoring of desired O_2 levels in a range of 0 – 20% for hypoxic studies.

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Security of proven water jacket technology.
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.

Power Failure Water Jacketed Temperature vs. Air Jacket Temperature with 18°C Ambient

Water Jacket

Air Jacketed

Temperature (°C)

Time (minutes)

Thermo Scientific Forma Series II Water Jacketed CO_2 Incubators

Recessed Power Switch

Sample Port

Front Fill Port

Smooth Front Fascia

CO_2/O_2 Sensors (in chamber)

Chamber Thru-Wall Access Port with Filter

Non-CFC Foam Insulated Outer Door (field reversible)

Sturdy Stainless Steel Shelves

Polished Stainless Steel Interior with 100% Coved Corners

Magnetic Outer Door Gasket

Heated Inner Door with Sealed Door Trim

Thermo Scientific Enviro-Scan® Microprocessor Message Center

Accessory Outlet Alarm Contacts (NO, NC, COM)

Blower Wheel/Scroll (directed airflow)

Dual Temp Probes (in chamber)

HEPA Filter

Triple-Wall Construction Water Jacket

Fiberglass Insulation

Removable, Cleanable Gasket

Stainless Steel Humidity Pan

Water Jacket Drain

Adjustable Feet

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

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

Setpoint – Set Temp, Overtemp, CO_2, O_2

Calibration – Calibrate Temp, CO_2, O_2, RH

Programming Buttons

Audible/Visual Alarm

Alarm Silence

Optional Built-In Gas Guard System

Mode Select

Scroll for Program Parameters

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)

Temperature Display

CO_2 Display

Gas Inject Indicator

Heater On Indicator

Thermo Scientific Forma Series II Water Jacketed CO_2 Incubators

Description	Cat. No.
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	
Humidity (RH) Display, readable in 1% increments, includes low RH programmable alarm (alerts you of need to add water to humidity pan), factory installed	190643
Shelving, Ductwork, and Humidity Pan	
Stainless Steel Shelf and Channels	190884
Solid Copper Components –	
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	190656
Copper Interior Ductwork	1900057
Copper Perforated Shelf with Channels	190879
Copper Humidity Pan (Fig. 01)	237020
Filters* and Decontamination Kit	
Replacement HEPA Filter (Fig. 04)	760175
HEPA Value Pack (4 filters)	760209
10 Disposable Polypropylene In-Line Filters	760210
HEPA Filter Replacement Kit, includes HEPA, inline, and access port filters	1900067
Replacement HEPA[2] VOC Filter	760200
HEPA[2] VOC Filter Replacement Kit, includes HEPA[2], in-line and access port filters	1900094
HEPA[2] VOC Filtration System (kit), converts HEPA Filter Airflow System to HEPA[2] Filtration System, includes HEPA[2] filter and two silicone plugs	760199
Decontamination Kit, includes sample port, HEPA filters, sensor gasket, wheel, and miscellaneous components	190651
Door Kit, Lock, and Right Hand Door Swing	
Independent Inner Glass Door Kit (eight glass doors with latches), mounts inside heated inner glass door, is removable and can be autoclaved (Fig. 02)	190650
Door Lock for Heated Inner Glass Door	190646
Right Hand Door Swing, factory installed at time of order	190666
CO_2 and N_2 Accessories	
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 –	
CO_2 Gas Guard	190640
N_2 Gas Guard	190642
Regulators with barbed connection and shut off valve –	
Two-Stage CO_2 Gas Regulator (Fig. 03)	965010
Two-Stage N_2 Gas Regulator	961027
Wall Clamp for a CO_2 Bottle, includes cylinder holder with web strap	950316
Roller Base and Stand	
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 (Fig. 06)	190647
Stand (heavy-duty steel) with leveling feet, raises unit 6.5" (16.5cm) off the floor	190648
Data Outputs (select one), factory installed	
RS-485 interface	190523
4-20 milliamp	190512
0-5V analog	190543
0-1V analog	190544
(continued)	

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

Thermo Scientific Forma Series II Water Jacketed CO_2 Incubators

Description	Cat. No.
Monitoring and Alarm Systems	
Monitor/Alarm System, interfaces with as many as 24 products (channels) to monitor and display equipment conditions up to 2,000 ft. away	1535
Sensaphone® Telephone Dialing Systems, interface with standard touch-tone phone system –	
For up to four input channels	400047
For up to eight input channels	400134
Datalogger, -50°C to 140°C (-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	201904
6", 7 Day Circular Chart Recorders –	
Single pen, 120V	201155
Single pen, 220V	201156
Dual pen, 120V, 2 probes, temp/temp (for stacked incubators)	201157
Dual pen, 220V, 2 probes, temp/temp (for stacked incubators)	201158
Dual pen, 120V, 1 probe, temp/RH	201159
Dual pen, 220V, 1 probe, temp/RH	201160
Miscellaneous Accessories	
Sealed Modular Incubator Chamber, purge with any gas mixture to create a "mini-incubator" inside your incubator for unusual gas and temperature (Fig. 05) controlled experiments, dimensions: 12.0" (30.5cm) circular chamber, 4.7" (11.9cm) high	190043
Chamber Cooling Coil, use with refrigerated water bath/circulator to operate incubator at lower than ambient temperatures, factory installed	190645
Replacement O_2 Sensor	290083
IQ/OQ, MS Windows®-compatible document disk for process customization and detailed checklists to qualify unit setup and operation	6013110

Fig. 01 | **Copper Humidity Pan**

Fig. 02 | **Inner Glass Door Kit**

Fig. 03 | **Two-Stage CO_2 Gas Regulator**

Fig. 04 | **HEPA Air-Filter (VOC)**

Fig. 05 | **Sealed Modular Incubator Chamber**

Fig. 06 | **Roller Dolly**

Thermo Scientific Forma Series II Water Jacketed CO$_2$ Incubators

Specifications

Temperature	
Control	±0.1°C
Range	5°C above ambient to 55°C (131F)*
Uniformity	±0.2°C @ 37°C (98.6F)
Tracking Alarm	User-programmable high/low
Temperature Safety	
Sensor	Precision thermistor
Controller	Independent analog electronic
Setability	0.1°C
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% @ 37°C (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)
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/	6 Amps/2 Pole
Power Switch	
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)

Orderimg Information

Cat. No.	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.

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

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