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TECHNOLOGY GROUP

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Forma® Direct Heat CO_2 Incubators



Forma Scientific, Inc.

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FORMA® DIRECT HEAT CO_2 INCUBATORS



Forma Direct Heat CO_2 Incubator with powder coat paint finish for durability and high quality appearance

Forma Scientific, the world leader in cell culture incubators, provides a proven and effective line of Direct Heat CO_2 Incubators. By applying both innovative flexible manufacturing techniques and world-class quality procedures to the production of these units, Forma has established a new industry paradigm for reliability, consistency, and delivery time.

DIRECT HEAT ADVANTAGES

- Cleared by the U.S. Food & Drug Administration (FDA) for In Vitro Fertilization (IVF) use
- Direct heat and non-CFC insulation surrounding chamber
- No chamber filling, draining, spillage, or low water alarms
- Cabinet weight reduced compared to water jacketed units

DESIGN ADVANTAGES

- Recessed power switch located on front of unit
- CO_2 sample port conveniently located on front of unit
- Easy-to-handle humidity pan
- Inner door switch with automatic CO_2 shutoff
- Electrical outlet on rear of unit for accessories
- Smooth, non-painted front fascia for easy cleaning
- Chamber thru-wall access port
- Field-reversible door swing

CULTURING ENVIRONMENT ADVANTAGES

- Heating elements surround all sides of outer chamber wall
- Microbiological filters on gas inlet and sample port
- Temperature probe positioned directly in chamber airflow
- Interior chamber with 100% coved corners
- Optional 100% HEPA Filter Airflow System (U.S. Patent 5,792,427)

MICROPROCESSOR CONTROL SYSTEM

- Automatic electronic start-up
- Microprocessor controls for temperature and CO_2
- Programmable tracking alarms for temperature and CO_2
- Independent overtemperature safety/alarm
- Dual temperature sensors
- Automatic electronic calibration of CO_2 (IR)
- Optional RH display

INTERIOR CHAMBER SELECTION

- Choice of shiny stainless steel or solid copper interior models
- Components include interior ductwork, four perforated shelves, and humidity pan

AUTOMATIC CO_2 CONTROL METHODS

- Thermal conductivity (T/C) sensor
- Infrared (IR) sensor
- CO_2 sensors located inside chamber

PRODUCT CERTIFICATIONS

- UL Listed
- CSA Certified
- CE Mark

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FORMA MICROPROCESSOR CONTROL/MONITORING SYSTEM

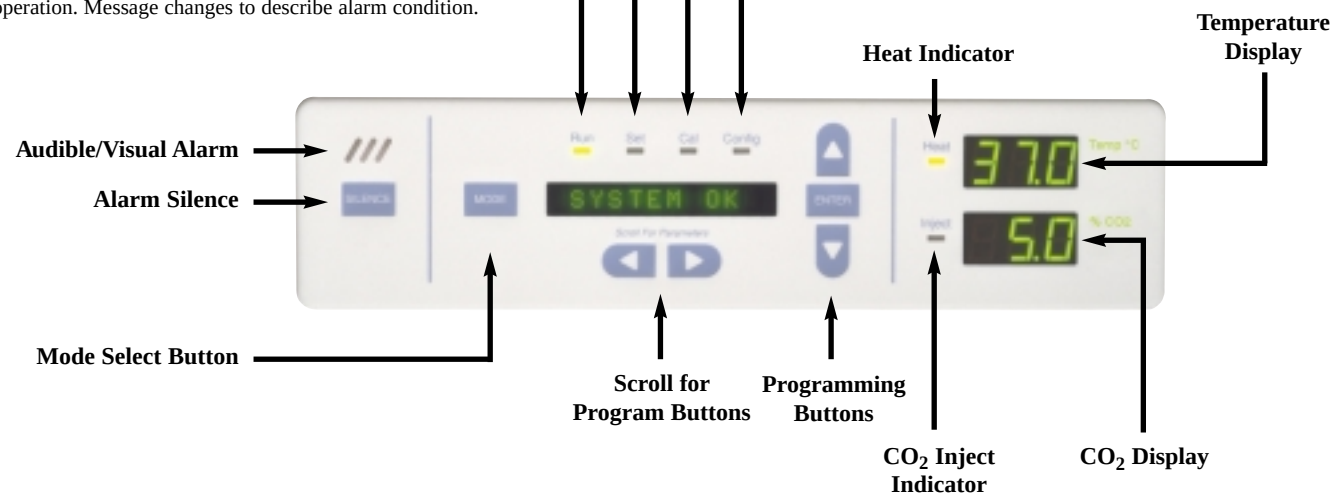
The Forma Microprocessor Control/Monitoring System on the Direct Heat CO_2 Incubator Series provides precise and accurate control over all parameters without complicated programming. Operating modes include Setpoint, Run, Calibration, and System Configuration.

Calibration Mode –
Allows you to calibrate the following parameters:
Temperature
CO_2
RH (optional)

System Configuration –
Allows you to define the following choices:
Audible On/Off
Access Code
Remote Alarm Contacts
Tracking Low Temperature Alarm
Tracking High and Low CO_2 Alarm
Optional RS-485 Interface
Optional Automatic Tank Selector
Optional Display Temp/RH (selectable)

Setpoint Mode –
Allows precise setting of the following parameters:
Temperature
Overtemperature
CO_2

Run –
Indicator and LED displays **SYSTEM OK** during normal operation. Message changes to describe alarm condition.



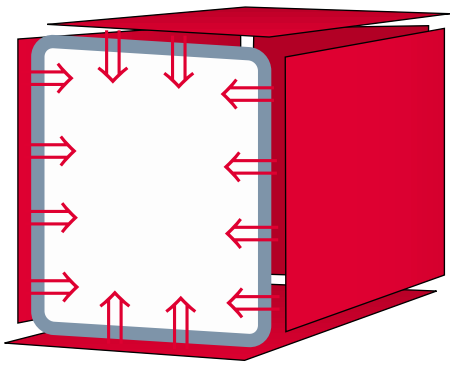
SYSTEM FEATURES

- 12 character, alpha-numeric message center displays control functions, setpoint parameters, and alarm conditions.
- Large easy-to-read LED displays actual Temperature, CO_2, and optional RH.
- Automatic electronic start-up allows the unit to be used without waiting for calibration.
- Setpoints and calibration values are retained in non-volatile memory.
- Recessed power switch is located on the front side of the unit.
- Self-test diagnostics are incorporated for peace-of-mind performance.
- Automatic electronic CO_2 calibration is standard on infrared (IR) models.
- Optional humidity package provides RH display in 1% increments and includes low RH alarm.
- Optional built-in gas guard monitors CO_2 supply and provides automatic tank switching.

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PRODUCT HIGHLIGHTS

- **Heating elements and fiberglass insulation surround all sides of the outer chamber wall** to provide uniform heating and faster recovery times after door openings, increasing performance and reducing operating costs.
- **Exterior cabinet construction** is 18 gauge cold-rolled steel, powder coated for durability and a high quality appearance that resists scratches and chipping. Salt spray tests exceed 1,000 hours per ASTM Standard 117B-85.
- **Chamber interior** is available in either shiny stainless steel or solid copper.* Interior chambers feature 100% coved corners that eliminate the chance of harboring contamination and allow easy cleaning.
- **Chamber design** provides 6.5 cu. ft. (184.1 liters) of usable culture space and accommodates a maximum of 17 shelves.
- **Four, heavy-duty, perforated shelves** (stainless steel or copper) are standard with matching interior ductwork and humidity pan. Non-tip shelf channels are included. Interior ductwork is easily removed without tools.
- **Conveniently sized humidity pan** is easy to handle and provides fast humidity recovery after door openings.
- **Inner glass door** is 0.25" (0.6cm) thick and seals tightly against a silicone gasket that surrounds the entire chamber opening. Door latch mechanism is located outside the chamber to eliminate a source for contamination.
- **Inner door switch** automatically shuts off CO_2 and heat when the inner door is opened.
- **Heated outer door** is insulated with non-CFC foam insulation to reduce the chance of condensation on the inner door. Outer door features a magnetic vinyl gasket to ensure a tight seal. Outer door can be opened to view the chamber contents without interrupting unit operation.
- **Inner and outer doors** are easily field reversible.
- **Interior plenum system** provides directed, uniform air movement which aids in temperature uniformity.
- **Blower motor** is mounted outside the culturing environment. Interior blower assembly is removable for complete decontamination.
- **Slide-out front drawer** allows easy access to electronic components.
- **Remote alarm contacts** (NO, NC, COM) for remote monitoring of chamber conditions are standard.
- **Optional built-in gas guard** can be factory installed to monitor CO_2 supply. It automatically switches from one cylinder to the other when the supply is exhausted.
- Forma Direct Heat CO_2 Incubators are **UL Listed, CSA Certified, and bear the CE Mark**. They are **cleared by the U.S. Food & Drug Administration for In Vitro Fertilization use (K001524)**.



Heating elements on all sides of the outer chamber wall provide uniform heating.



Stainless steel shelf system is removed easily without the use of tools.

OPTIONAL HEPA FILTER AIRFLOW SYSTEM

- Factory installed, patented HEPA Filter Airflow System (No. 190858) **filters the entire chamber volume of air every 60 seconds** using slow, gentle, uniform air movement throughout the chamber.
- Unique HEPA Filter Airflow System is conveniently **located inside the chamber, providing 100% HEPA filtered air**.
- **Chamber air is continuously drawn through the HEPA filter** (rated a minimum 99.97% efficient at 0.3 microns) to provide an aseptic culturing atmosphere.
- **Replacement HEPA filter** (No. 760175) can be replaced easily without the use of tools.



No. 760175

All copper components (interior chamber, perforated shelves, interior ductwork, and humidity pan) are solid copper, **not plated.*

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MODEL SELECTION

MODEL	INTERIOR	CO_2	VOLTAGE
310	Stainless Steel	Thermal Conductivity	115
311	Stainless Steel	Thermal Conductivity	230
320	Stainless Steel	Infrared	115
321	Stainless Steel	Infrared	230
350	Copper	Thermal Conductivity	115
351	Copper	Thermal Conductivity	230
360	Copper	Infrared	115
361	Copper	Infrared	230

SPECIFICATIONS

Temperature
Control . . . . . ±0.1C
Range . . . . . 5C above ambient to 50C (122F)
Uniformity . . . . . ±0.2C @ 37C (98.6F)
Tracking Alarm . . . . . User-programmable low

Overtemperature
Sensor . . . . . Precision thermistor
Setability 0.1C
Function . . . . . Shuts off heat

Temperature Safety
Sensor . . . . . Independent thermostat
Controller . . . . . Independent analog electronic

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

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

Fittings
Access Port . . . . . 1-1/4" (3.2cm) with removable silicone plug
CO_2 Inlet . . . . . 1/4" hose (barbed)

Unit Heat Load
115V/230V . . . . . 341 BTUH (100 Watt) 85 kcal per hour

Dimensions
Exterior . . . . . 26.1"W x 38.5"H x 24.7"F-B (66.3cm x 97.8cm x 62.7cm)
Interior . . . . . 21.4"W x 26.8"H x 20.0"F-B (54.4cm x 68.1cm x 50.8cm)

Shelves
Dimensions . . . . . 18.5" x 18.5" (47.0cm x 47.0cm)
Construction . . . . . Perforated stainless steel or copper
Surface Area . . . . . 2.4 sq. ft. (0.2 sq. m) per shelf
Max. per Chamber . . . . . 40.8 sq. ft. (3.8 sq. m)
Standard 4
Maximum 17

Construction
Interior Volume . . . . . 6.5 cu. ft. (184.1 liters)
Interior . . . . . Type 304, shiny stainless steel or solid copper
Exterior . . . . . 18 gauge, cold-rolled steel, powder coated
Outer Door Gasket . . . . . Four-sided, molded, magnetic vinyl
Inner Door Gasket . . . . . Feather-edged, silicone

Electrical
115V Models . . . . . 115V, 50/60 Hz, 2.4 FLA (Operating range 90-125V)
230V Models . . . . . 230V, 50/60 Hz, 1.5 FLA (Operating range 180-250V)
Circuit Breaker . . . . . 6 Amps
Power Switch . . . . . 2 Pole
Accessory Outlet . . . . . 75 Watts maximum (matches cabinet voltage)
Alarm Contacts . . . . . Deviation of temperature, CO_2, RH, and power failure. Accessed using RJ11 jack on rear of unit.
Optional Data Outputs . . . . . RS-485, 0-1V, 0-5V, 4-20 milliamp (select one)

Shipping Weight
Air/Motor . . . . . 270 lbs. (122.5 kg)
Ocean . . . . . 360 lbs. (163.3 kg)

Continuing research and improvements may result in specification changes at any time.

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OPTIONAL EQUIPMENT AND ACCESSORIES

190858 **HEPA Filter Airflow System –** Factory installed option filters entire chamber air volume every 60 seconds, providing 100% HEPA filtered air to create a clean culturing atmosphere.

760175 **Replacement HEPA Filter –** Rated a minimum 99.97% efficient at 0.3 microns. Customer installed filter is easily replaced without tools.

1900067 **Filter Replacement Kit –** Replacement filters for the filtered air system. HEPA filter is rated a minimum 99.97% efficient at 0.3 microns. Customer installed filters are easily replaced without tools.

155021 **Fyrite Analyzer Kit –** CO_2 Fyrite analyzer kit, 0-20%.

190868 **Decontamination Kit –** Complete with HEPA filter and blower assembly.

190869 **Decontamination Kit –** Complete with blower assembly.

190640 **Built-in CO_2 Gas Guard –** Factory installed to monitor CO_2 supply. Automatically switches from one cylinder to the other when the supply is exhausted.

190643 **Humidity Display –** Factory installed option provides RH display. Readable in 1% increments. Low RH programmable alarm alerts you of the need to add water to the humidity pan.

190650 **Independent Inner Glass Door Kit –** Eight separate glass doors with latches. Customer installed kit mounts inside the inner glass door and is removable.

Factory Installed Data Outputs (Select One) –

190523 RS-485 interface
190512 4-20 milliamp
190543 0-5V analog
190544 0-1V analog

190043 **Modular Incubator Chamber –** Sealed unit can be purged with any gas mixture, creating a “mini-incubator” inside your incubator for unusual gas and temperature controlled experiments. Unit dimensions: 12.0" (30.5cm) circular chamber, 4.7" (11.9cm) high.

1535 **Monitor/Alarm System –** Customer installed system interfaces with as many as 24 products (channels) to monitor equipment conditions up to 2,000 ft. away.

Sensaphone® Telephone Dialing System – Customer installed system interfaces with any standard touch-tone phone system to provide remote monitoring of equipment.

400047 Accommodates up to four input channels
400134 Accommodates up to eight input channels

1900063 **Roller Dolly –** Heavy-duty, powder coated steel base with dual-wheel, swivel locking casters. Designed to support one or two Forma Direct Heat CO_2 Incubators. Raises unit 3.0" (7.6cm) off the floor.

965010 **Two Stage Gas Regulator/CO_2 –** With barbed connection and shut-off valve.

6000310 **Installation and Operational Qualifications (IQ/OQ) –** MS Windows® compatible document disk for easy process customization and fully detailed checklists to qualify unit setup and operation.

Chamber and Shelf Components –

190879 Copper Shelf Kit
237020 Copper Pan
190870 Copper Ductwork (includes shelf supports, top duct, shelf channels, four shelves and pan)
190884 Stainless Steel Shelf Kit
237016 Stainless Steel Pan
190670 Stainless Steel Ductwork (includes shelf supports and shelf channels)

6", 7 Day Circular Chart Recorders – We offer a complete selection of 0C to 60C (32F to 140F) single and dual pen circular chart recorders for all Forma Direct Heat CO_2 Incubators. Contact our Sales Support Department for complete details.



No. 190650



No. 190043



No. 400047 or 400134



No. 965010



Chart recorder

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Leader in Quality and Safety

For your personal safety and product protection, Forma Direct Heat CO_2 Incubators are manufactured to conform with our Continuous Improvement guidelines. Our commitment to you is reinforced by our adherence to known quality standards.

ISO 9001: A Commitment to Excellence

As an innovative, global leader, Forma Scientific continues the pursuit of excellence by maintaining ISO 9001 registration. This advanced quality system reinforces our commitment to provide the highest quality products available. The ISO 9000 series is a set of international requirements for establishing and maintaining quality management systems. It is based on the widely recognized quality assurance standards of the British Standards Institute (BSi). Continued compliance is assured by ongoing internal audits and periodic audits by the assessing agency. We are proud to be ISO 9001 registered.

UL Listing, CSA Certification, and CE Mark

UL Listing (Standard UL 3101-1), CSA Certification (Standard C22.2 No. 1010.1), and the CE Mark (EN 61010/IEC 1010) attest to the electrical and mechanical safety of our incubators. Unit construction and electrical characteristics are in compliance with Underwriters Laboratories, Inc., CSA International, and International Electrotechnical Commission requirements. Forma Direct Heat CO_2 Incubators undergo stringent testing before they carry the UL, CSA, and CE markings. Application of the CE Mark also means that Forma Direct Heat CO_2 Incubators have been tested for compliance with international requirements related to emission of, and susceptibility to, RF energy and electrostatic discharge. Copies of UL, CSA, and CE documentation are available for compliance verification.

Warranty Protection

We confidently back our Forma Direct Heat CO_2 Incubators with a full one year parts and labor warranty. The CO_2 gas sensor (T/C) is covered by a five year warranty. The CO_2 gas sensor (IR) is covered by a two year warranty. Forma Scientific is the only manufacturer in the world to offer this complete coverage for CO_2 incubators. Call our Technical Service Department or your local international distributor for details.

Direct Service System: Unmatched Service Four Ways

- To save you both time and expense, our toll-free Technical Service Department (1-888-213-1790) provides access to qualified telephone technicians who can help you troubleshoot and make adjustments to your Forma equipment. In an ongoing effort to better serve you, our Technical Service Department and our Sales Support Department (1-800-848-3080) are available from 8:00 a.m. to 7:00 p.m. (ET). International customers can call 740-373-4763 for Sales Support from 8:00 a.m. to 4:30 p.m. (ET) and for Service Support from 8:00 a.m. to 7:00 p.m. (ET).
- For added coverage, we offer an Extended Warranty to repair or replace component parts proven to be non-conforming once the original warranty period has ended. For additional convenience, we also provide Preventive Maintenance Agreements and unit temperature mapping. Contact our Technical Service Department for details.
- A staff of direct factory-trained service technicians is maintained in major metropolitan areas of the United States. In all other areas, service needs are provided by factory-trained service organizations.
- Outside the U.S., service and warranty work are available through our distributors who are authorized to work on Forma products. Contact your local distributor for details.

Other Forma Incubators Available

In addition to the line of Forma Direct Heat CO_2 Incubators, we offer a complete line of cell culture incubators to meet a wide variety of research and culturing applications. Contact us for complete details.

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Forma offers the following products:

- Cell Culture Incubators
- In Vitro Fertilization (IVF) Incubators
- Environmental Chambers
- Ultra-Low Temperature Freezers
- Laminar Airflow Equipment
- Biological Safety Cabinets
- Cryopreservation Equipment
- Blood Bank Equipment
- Orbital Shakers
- Monitor/Alarm System
- Programmable Centrifuges
- Lab Washers and Dryer
- Lab Refrigerators
- Lab Freezers
- Chromatography Refrigerators
- Custom-Designed Equipment

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We buy equipment

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