Thermo Scientific Forma Environmental Chambers

Versatile chambers for any application

Thermo Fisher
SCIENTIFIC

Environmental Chambers to meet your needs

Your work is unique and specific, just like the conditions required for maximum sample integrity. The Thermo Scientific™ Forma™ 3900 Series Environmental Chambers are flexible in design with many options, providing the ideal conditions for you to develop, test and store your samples, all while meeting industry compliance standards.

Choose the environmental chamber with the features you need

Forma Stability Chambers are the ideal choice to meet compliance standards for ICH, FDA, TAPPI, ASTM, or national testing standards when controlled temperature and humidity are required.
• See pages 4-8

Forma Reach-in refrigerated incubator chambers are perfect for applications that require temperature control below and/or above ambient, e.g. storage, testing, and incubation at low temperatures.
• See pages 4-8

Forma Reach-in Incubator Chambers are the ideal choice if you are focused on elevated temperature-only segments of drug stability and culture.
• See pages 9-13

Forma Vertical Light Chambers are the ideal choice for light stability testing, as they meet the ICH guidelines for photo stability testing Q1B. These models also allow you to stimulate gradual transitions from day to night, making them suitable for plant and insect growth.
• See pages 14-19

At-a-glance environmental chamber comparison

Temperature Range		Relative Humidity	Size (Cu. Ft./L)	CO_2	Model/ Cat No.
Stability Chambers					
Large Chamber	0°C to 60°C	Above ambient to 95% @ 37°C	29 / 821	Optional	3940
Small Chamber	0°C to 60°C	Above ambient to 95% @ 37°C	11 / 311	Optional	3911
Reach-in Refrigerated Incubator Chambers					
Large Chamber	0°C to 60°C	N/A	29 / 821	Optional	3920
Reach-in Incubator Chambers					
Large Chamber	5°C above ambient to 60°C	N/A	29 / 821	N/A	3960
Vertical Light Chambers					
Large Chamber	0°C to 60°C *	Above ambient to 95% @ 37 C *	29 / 821	N/A	3942
Large Chamber	0°C to 60°C *	N/A	29 / 821	N/A	3928
Small Chamber	0°C to 60°C *	Above ambient to 95% @ 37°C *	11 / 311	N/A	3909

* Stated values refer to lights off. Temperature range and humidity range will vary depending on light and chosen parameters. Please refer to the specification tables on pages 18-19 for details on use of light.

Contents

Stability, Refrigerated Incubator Chambers provide optimal conditions

Both the stability chambers and refrigerated incubator chambers meet International Conference on Harmonization (ICH) guidelines for drug substance and product storage testing. The units are ideal for drug stability studies, shelf-life testing for packaged products, and insect and other large-scale biological research.

Optimum uniformity and a wide temperature range for easy compliance with regulatory requirements

These chambers feature a 0°C to 60°C (32°F to 140°F) temperature range that can be set in 0.1°C increments. The broad temperature range, and optimum temperature uniformity and recovery contribute to an ideal test environment, even when the chamber contains large product loads and low-output, heat-generating equipment.

Advantages of a directed horizontal laminar airflow system

The Thermo Scientific™ Directed Airflow System (shown below in Figure 1) promotes an ideal growth environment. The enhanced design includes a positive pressure feed plenum on the right side of the chamber and a negative pressure return plenum on the left to distribute the airflow uniformly throughout the chamber.

This combination directs air across the surface of each solid shelf. Even when filled with samples or equipment, each shelf receives a consistent flow of conditioned air for optimum temperature uniformity and recovery.

As opposed to a horizontal airflow system, top-to-bottom (non-directed) airflow systems use a top-mounted fan to push air down through wire shelves.

Temperature uniformity and recovery can deteriorate quickly when shelves are filled because air movement is blocked. That variation in temperature, alone or when combined with frequent door openings, may compromise environmental conditions or make process validation difficult.

Standard 4 to 20 milliamp output connects to most alarm/monitoring systems, allowing you to meet internal and regulatory product documentation requirements. Chart recorders are also available.
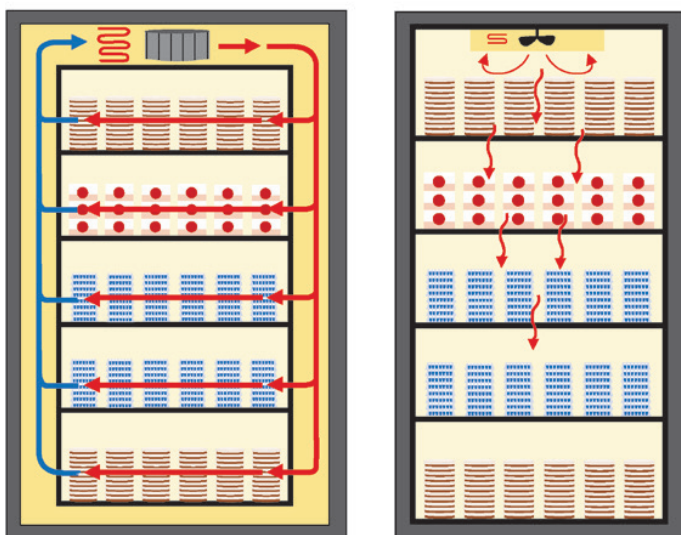

Figure 1. The Thermo Scientific Directed Airflow System (left) versus a top-to-bottom, undirected airflow design (right). The directed airflow minimizes the risk of product desiccation and loss, and wasted time and money due to poor temperature uniformity and recovery.

Durable construction and intuitive control panel

Humidity Controller *
Displays actual RH (%) and setpoint (ramp and soak).

Temperature Controller
Displays actual chamber temperature and setpoint (ramp and soak).

Humidity Alarm and Indicator *
Indicates deviation of cabinet humidity from set parameters.

Over-temperature Safety Thermostat and Indicator
Set over-temp condition (alarm and light indicate over-temp condition).

Main Power Switch and Indicator

Under-temperature Safety Thermostat and Indicator
Set under-temp control (alarm and light indicate under-temp condition).

Dehumidify and Humidify Switches and Indicators *
Control humidification and refrigeration systems, show cycle status (dehumidify switch operates only with optional heatless dryer).

Defrost and Refrigeration Switches and Indicators
Adjustable defrost timer is factory set for two 15-minute defrost cycles during a 24-hour period.

Standard access port
on left side for data logging and use of electrical equipment inside the chamber, diameter of 54 mm /2.1 in. Ideal for use with Thermo Scientific™ Smart-Vue™ Sensors.

Exterior Glass Door
Allows easy inspection of samples and is heated for reduced condensation. Solid door is available for light sensitive applications.

Solid, stainless steel interior and 2.0" (5.1 cm) thick fiberglass cabinet insulation.

18-gauge cold-rolled steel
powder coated exterior cabinet resists scratches and chipping.

Rugged shelf construction
29.0 cu ft models include 6 adjustable shelves. 11.0 cu ft model includes 3 adjustable shelves.

Forma Stability Chamber with standard outer glass door.

*Forma Environmental Chamber models 3940 and 3911 include humidity control, while the Forma Environmental Chamber model 3920 is temperature-only.

Broad range of options create a perfect fit for your applications

Many options are available so you can tailor this series to your specific applications.

Factory-installed options (ordered separately) include:

- Choice of access ports for inserting data logging sensors or cables.

- Duplex sockets to run electrical devices in chamber.

- Choice of chart recorders for data logging.

- Infrared CO_2 Control Package for control of a CO_2 environment.

- Solid outer door with choice of inner glass door - for light sensitive applications, such as incubation or storage.

- Door options include door lock, left-hand door, and Lexan™ inner door.

- Choice of shaker support systems provides system safety.

- Temperature mapping and calibration certificate – customized.

Accessories/on-site options (ordered separately) include:

- Extra and special shelving.

- Reinforced floor options for heavy weights – up to 250 lb.

- Cell roll system for production of monolayer cell cultures (see page 12).

- On site IQ / OQ / PQ validation services.

Forma Large Stability Chamber with control of temperature and humidity, with optional solid door and inner glass door.

Options for the humidity system:

- Heatless dryer for low humidity conditions – check temperature / humidity chart on the following page.

- Condensate pump kit: recommended when the accessible drain on lab wall is well above the drain on back of environmental chamber.

- Condensate evaporator: recommended for labs with no accessible drain. External heating device which burns off waste water.

- Carboy kit for installation in labs with no water connection.

See page 22 for order numbers, model compatibility and additional information

Temperature/humidity performance chart

for stability and refrigerated incubator chambers

The chart in Figure 2 illustrates the maximum and minimum attainable humidity within the cabinet at a given set temperature under the following nominal conditions: refrigeration on, defrost off, no wet bulb recorder, no air exchange, set for 22.2°C (72°F) and 50% RH ambient. Optional heatless dryer is available for lower humidity levels.
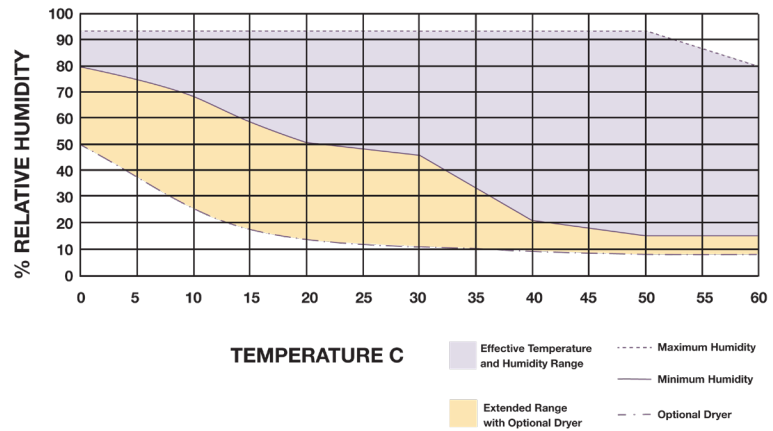
▓ Effective Temperature and Humidity Range	------ Maximum Humidity	
▓ Extended Range with Optional Dryer	—— Minimum Humidity	
	– · – Optional Dryer	

Figure 2. Illustrates the humidity range of the Forma Environmental Chamber Models 3940 and 3911.

Specifications

	Forma Reach-In Refrigerated Incubator Chamber	Forma Stability Chamber	Forma Stability Chamber
	Cat. No. 3920	Cat. No. 3940	Cat. No. 3911
Physical properties			
	29 cu. ft. Reach-In Refrigerated Incubator Environmental Chamber with heating / cooling	29 cu. ft. Stability Chamber with heating / cooling / humidity control	11 cu. ft. Stability Chamber with heating / cooling / humidity control
Temperature			
Temperature range	0°C to 60°C (32°F to 140°F)		
Controller, sensor	Watlow Microprocessor - PID, with RTD sensor		
Display	Digital dual LED, 0.1°C steps readability & setability		
Programmability	Single setpoint, ramp & soak (to 40 steps)		
Temp. uniformity @ 20 to 37°C	≤ ±0.3 °C		
Temp. stability @ 20 to 37°C	≤ ±0.1 °C		
Temperature safety	Adjustable over- and under-temperature thermostat with analog reference dial, audible/visual alarm		
Compressor	1⁄4 HP, air-cooled		
Refrigerant	Non-CFC, R-513A refrigerant; 0.382kg; GWP: 631; CO2e: 0.24t		

Specifications, continued

	Forma Reach-In Refrigerated Incubator Chamber Cat. No. 3920	Forma Stability Chamber Cat. No. 3940	Forma Stability Chamber Cat. No. 3911
Humidity			
Water consumption / specification	N/A	Max. 14 L per day / 3.7 gal per day; demineralized water, resistance: 0.5 - 1 MΩ cm	
Input water pressure	N/A	Gravity to 40 psi (2.76 bar)	
Relative humidity range	N/A	Above ambient to 95% @ 37°C (98.6°F) ±5.0% RH	
Controller, sensor	N/A	Watlow Microprocessor - PID, with capacitive sensor - thin film polymer	
Display	N/A	Digital dual LED, 1% RH steps readability & setability	
Programmability	N/A	Single setpoint, ramp & soak (to 40 steps)	
Humidity safety	N/A	Audible / visual alarm in case of deviation from setpoint	
Water connection*	N/A	Fill port: 1⁄8" female NPT, drain port: 3⁄8" FPT & 3⁄8" O.D. P-trap right rear, intial fill approx. 1L / 1qt.	
Electrical			
Voltage	120V, 60Hz, 16.0 Amps 3 Wire (including ground)	208-220V, 60 Hz, 15.0 Amps 4 Wire (including ground) single phase	
Plug	NEMA 5-20P	NEMA 14-20P	
Power switch	2-Pole		
Dry contacts	Common, NO, NC		
Data output	4-20 milliamp, temperature	4-20 milliamp, temperature and RH	
Data collection			
Access port	54mm / 2.1 in. Diameter; left side; with exterior and interior silicone stopper		
Chamber dimensions			
Exterior (W x H x D)	965 x 2248 x 813 mm / 38.00 x 88.50 x 32.00 in.		965 x 1308 x 813 mm / 38.00 x 51.50 x 32.00 in.
Interior (W x H x D)	787 x 1524 x 686 mm / 31.00 x 60.00 x 27.00 in.		787 x 609 x 686 mm / 31.00 x 24.00 x 27.00 in.
Net weight	318 kg / 700 lbs	347 kg / 765 lbs	261 kg / 575 lbs
Shipping weight	386 kg / 850 lbs	472 kg / 1040 lbs	325 kg / 715 lbs
Shelving			
Materials	Solid stainless steel, reinforced		
Number of shelves: standard / maximum	6 / 19	6 / 19	3 / 11
Shelf size (W x D)	778 x 656 mm / 30.62 x 25.81 in.		
Shelf surface area	0,5 m² / 5.4 ft²		
Load per shelf	15.9 kg / 35 lbs slide in/out; 22.7 kg / 50 lbs stationary; not to exceed 272 kg / 600 lbs total per cabinet		
Compliance			
Certifications	cULus		
Medical device	FDA registered - class 1		

* All models require a drain unless fitted with the optional Thermo Scientific Condensate Evaporator (Cat. No. 1900031). Forma Chamber models 3940 and 3911 also require a constant water source.

NOTE: All figures in all tables are typical average values for series devices, based on factory standard following norm DIN12880. Please reference page 25 and/or contact us for certification information or IQ/OQ documents. For other voltage versions, please refer to the Thermo Scientific Environmental Chamber models, available at thermofisher.com/chambers in relevant countries.

Reach-in incubator for elevated temperature applications

Precise temperature control and monitoring makes this unit ideal for clinical applications where elevated temperature stability is required

Temperature range
ambient + 5°C to 60°C (140°F), increasing at 0.1°C increments.

Thermo Scientific™ Enviro-Scan™ controls with easy-to-read display of actual temperature studies, and shelf-life testing. See pg 10 for more information on the Enviro-Scan control panel.

Duplex interior socket for use of electrical equipment inside, i.e., a stirrer.

Two access ports included, one on each side of equipment, with slicone stopper for independent data monitoring, e.g. with Thermo Scientific Smart-Vue Sensor.

Solid door with inner glass door (option with separate order code) for microbiological or other incubation applications that are light sensitive.

Solid, stainless steel interior and thermal fiber insulation.

Large size for high volumes and a broad range of products.

Solid stainless steel shelves. 29 cu ft models include 6 adjustable shelves, 11 cu ft models include 3 adjustable shelves.

18-gauge cold-rolled steel, powder coated exterior cabinet resists scratches and chipping.

Forma Reach-in Incubator Chamber with optional outer solid door plus inner glass door. (Standard is just outer glass door.)

Uniformity and elevated temperature range to meet compliance needs

Intuitive, powerful temperature control

- The control panel

  – ensures precise temperature control without complicated programming.

  – provides audible/visual under-temperature and over-temperature alarms for peace-of-mind.

  – includes an easy-to-read display for convenient, continuous monitoring.

- The Thermo Scientific Enviro-Scan user interface operating modes include run, setpoint, calibration, and system configuration.

- Standard remote alarm contacts and available data outputs allow connection to an in-house monitor/alarm system to track chamber conditions, helping you meet internal and regulatory documentation requirements. Chart recorders are available.

- Utilizes direct airflow system for an ideal growth environment. The proven design includes a positive pressure feed plenum and a negative pressure return plenum. This combination directs air across the surface of each solid shelf. Even when filled with samples or equipment, each shelf receives a consistent flow of conditioned air for optimum temperature uniformity and recovery. By design, the feed plenum cannot be blocked by the chamber's contents. (Refer to Figure 1 on page 4.)

Forma Reach-in Incubator Chamber with optional outer solid door and interior glass door is optimally designed for cell growth.

Valuable features included for flexibility

Casters, access ports, convenience receptacles, heated glass door, and remote alarm contacts are supplied as standard. The Forma Reach-In Incubator Chambers will help you meet your changing application needs without the added cost of expensive add-on options.

Swivel, locking casters ensure easy mobility during installation and cleaning. Leveling feet provide stability and added safety in the lab.

Thru-wall access ports, located on the right and left sides of the chamber, make it possible to add probes, sensors, etc. without altering the cabinet. A Thermo Scientific Smart-Vue Sensor is pictured above. For more information, visit thermofisher.com/wirelessmonitoring.

Interior and exterior accessory receptacles provide a convenient power source

Interior GFCI duplex receptacle located in the upper right corner of the rear wall, permits the use of shakers, cell rollers, and other equipment inside the chamber, eliminating the inconvenience of an extra external power strip.

Exterior receptacle, located on the upper-right side of the control panel, is available for connecting an optional recorder or other Forma accessories.

Cell Roll System

An optional cell roll system allows extensive production of monolayer cell cultures in standard roller culture vessels. This helps improved oxygenation and exposure of the cells to the media growth area. Combined uniform temperature control and continuous, gentile rotation provided by the cell roll system create the ideal conditions to help increase culture yields.

The reach-in incubator chamber accommodates a cell roller up to 7 decks high with 5 positions per deck for a maximum total of 35 positions, or bottles.

Achieving maximum capacity requires a Thermo Scientific™ Cell Roll System, which includes a Thermo Scientific™ Three-Tier Cell Roller Base (15 positions), four add-on tiers (20 positions), and a reinforced floor/ramp.

All position drive is standard. Adjustable speed control provides precise speeds of 0.125 to 6.25 RPM with ±1.0% accuracy, based on 110 mm bottles.

Thermo Scientific Three-Tier Cell Roller System. See accessory list on page 23 for the complete list of accessory catalog numbers.

Forma Reach-in Incubator Chamber with standard outer glass door and optional Thermo Scientific Cell Roller System, three-tier roller base, four add-on tiers and reinforced floor with ramp.

Specifications

Forma Reach-In Incubator Chamber	
Cat. No. 3960	
Physical properties	
	29 cu. ft. Reach-In Incubated Chamber with heating only
Temperature	
Temperature range	5°C above ambient to 60°C
Controller, sensor	Enviro-Scan - PID, with RTD sensor
Display	Digital dual LED, 0.1°C steps readability & setability
Temp. uniformity	≤ ±0.4 °C @ 30°C; ≤ ±0.3 °C @ 37°C; ≤ ±0.5 °C @ 45°C
Temp. stability @30 to 45°C	≤ ±0.1 °C
Electrical	
Voltage	115V, 50/60Hz, 9.0 Amps 3 Wire (including ground)
Plug	NEMA 5-15P
Power switch	2-Pole
Interior convenience receptacle	230W max., for standard US Nema 5-15 plug
Exterior convenience receptacle	75W max., for connection of available options, e.g. chart recorder
Alarm contacts	Temp. Deviation and power failure; Common, NO, NC; customer connections through RJ11 jack
Data collection	
Access port	61mm / 2.4 in. diameter; one on each side; with exterior stopper
Chamber dimensions	
Exterior (W x H x D)	965 x 2032 x 833 mm / 38.00 x 80.00 x 33.00 in.
Interior (W x H x D)	787 x 1524 x 686 mm / 31.00 x 60.00 x 27.00 in.
Net weight	227 kg / 500 lbs
Shipping weight	300 kg / 660 lbs
Shelving	
Materials	Solid stainless steel, reinforced
Number of shelves: standard / maximum	5 / 27
Shelf size (W x D)	778 x 656 mm / 30.62 x 25.81 in.
Shelf surface area	0,5 m² / 5.4 ft²
Load per shelf	13.6 kg / 30 lbs, fully inserted and stationary; not to exceed 136 kg / 300 lbs total per cabinet, unless shaker support is installed
Compliance	
Certifications	cULus
Medical device	FDA registered - class 1

NOTE: All figures in all tables are typical average values for series devices, based on factory standard following norm DIN12880. Please reference page 25 and/or contact us for certification information or IQ/OQ documents. For other voltage versions, please refer to Thermo Scientific Environmental Chamber models, available at thermofisher.com/chambers in relevant countries.

Vertical light chambers

Forma Vertical Light Chambers address a variety of applications that require sample exposure with light, along with temperature control

- Solid door is supplied as standard.

- Height adjustable vertical light modules allow flexibility to maintain distance between samples and light, for a wide range of sample volumes.

- Optimal conditions can be achieved through a choice of light settings. Wide light distribution is achieved with 7 light bulbs. See pages 15-17 for application details.

- Three different light modules are available to address specific applications:

  – ICH stability testing – addressing light and UV exposure according to guideline Q1B

  – Plant growth – addressing high red/blue radiation for optimal growth conditions

  – Animal hatching – providing daylight simulation

- Program light cycles:

  – Day/night or individual on/ off cycles for every day of the week

  – Dawn/dusk simulations with increasing light intensity in 3 steps

Light modes can be active or inactive, making the chambers suitable for non-light applications, using temperature and humidity controls only.

Install up to 3 light modules without humidity control or 2 light modules with humidity control in the large unit (water-proof special electrical connectors are provided).

Install up to 2 light modules in the small unit (water-proof special electrical connectors are provided).

Forma 29 cu. ft. Vertical Light Chamber with two plant growth light modules (top) and Forma 11 cu. ft. Vertical Light Chamber with two ICH light modules (left).

Light stability testing

According to ICH guidelines Q1B

The light modules for light stability testing according to ICH guidelines Q1B* have a combination of bulbs that address the required wavelengths, and UV light according to these guidelines.

A typical process to expose the samples with at least 1.2 million lux hours and 200 watt hours/square meter of UV-light will take less than 170 hours. Such a cycle can easily be programmed: The light will switch off automatically as the specified exposure time is reached.

Tip: For safety reasons we offer an additional "light protection" feature when following ICH testing guidelines. With this added, the light will automatically switch off as the door is opened, helping to prevent UV light exposure as it can be detrimental to the operators' eyes. Special UV-googles are an alternative approach.

The International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use (ICH)

The International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use (ICH) is an initiative that brings together regulatory authorities and pharmaceutical industry to discuss scientific and technical aspects of pharmaceutical product development and registration. The mission of the ICH is to promote public health by achieving greater harmonisation through the development of technical Guidelines and requirements for pharmaceutical product registration. The ICH guidelines for testing are adopted by many organizations and companies. The guideline Q1B is a very important guideline for pharmaceutical and related industries.

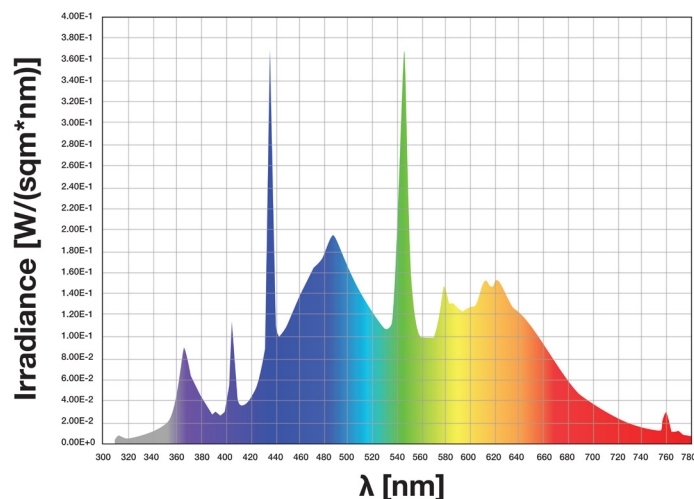Forma Vertical Light Chamber with glass door option and ICH light modules installed.

Figure 3. This graph shows the range of the light spectrum inside the Forma Vertical Light Stability Chamber Models 3942 and 3909 when set with ICH light modules.
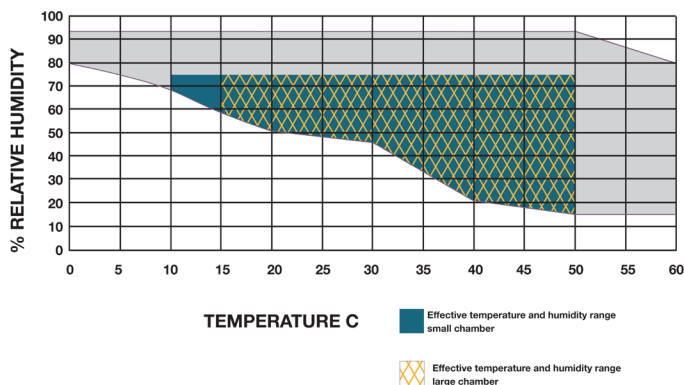

Figure 4. Illustrates the humidity range of the Forma Vertical Light Stability Chamber Models 3942 and 3909 when light is switched on - two light modules installed.

*https://www.ich.org/fileadmin/Public_Web_Site/ICH_Products/Guidelines/Quality/Q1B/Step4/Q1B_Guideline.pdf, Accessed April 15, 2019

Plant growth

The light modules for plant growth have light bulbs that emit increased red and blue wavelengths based on typical sunlight patterns, which are beneficial for plant growth. The light control allows for the programming of individual day/night cycles, as required for your specific plants or experiments.
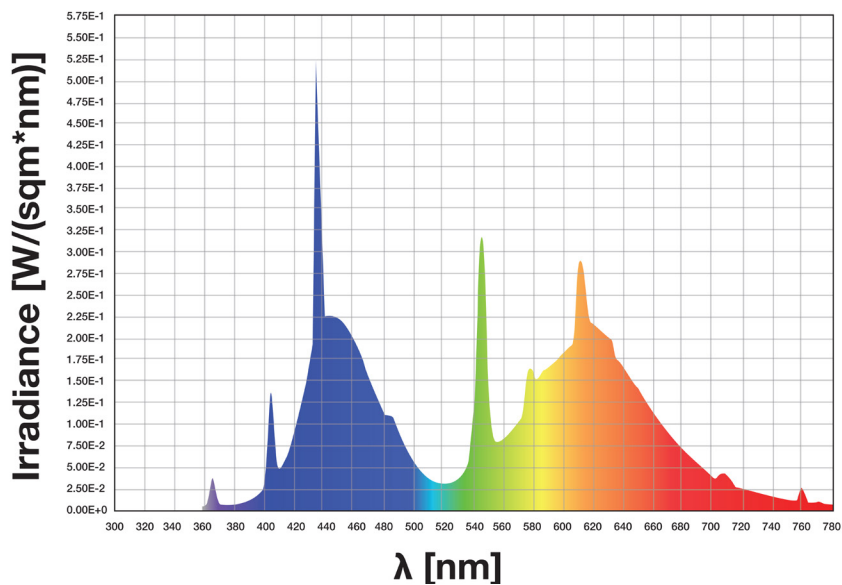

Figure 5. This graph shows the range of the light spectrum inside the Forma Vertical Light Stability Chamber Models 3942 and 3909 when set up with plant growth light modules.

Interior of Forma Vertical Light Chamber with plant growth light modules installed.

Forma Vertical Light Chamber with glass door option and plant growth light modules installed.

Insect hatching

The light modules for insect hatching have bulbs that mimic daylight – ideal for the required day/night simulation. A dusk/dawn feature enables a progressive program that simulates a rising and setting sun, switching on and off in three steps. This helps prevent stress to insects and animals from sudden high-light exposure.
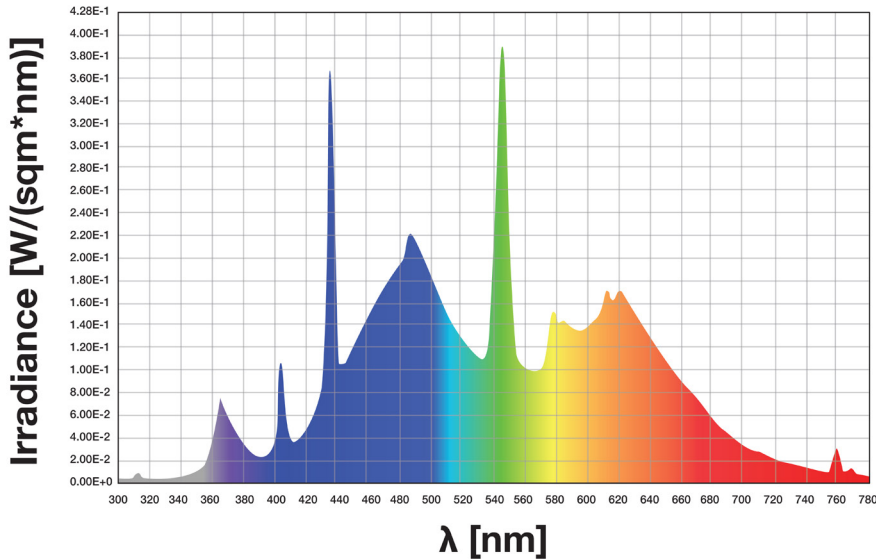

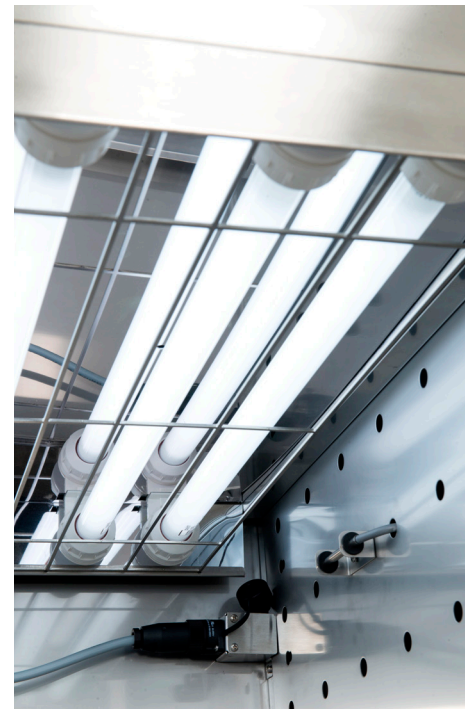Interior of Forma Vertical Light Chamber with animal hatching light modules installed.

Figure 6. This graph shows the range of the light spectrum inside the Forma Vertical Light Reach-In Incubator Chamber Model 3928 when set up with animal hatching light modules.

Note: For applications that require control of all three parameters, temperature, light and humidity a maximum of 2 light cassettes can be used in both the small and large chambers.

Specifications

	Forma Vertical Light Reach-In Refrigerated Incubator Chamber Cat. No. 3928	Forma Vertical Light Stability Chamber Cat. No. 3942	Forma Vertical Light Stability Chamber Cat. No. 3909
Description			
Physical properties	29 cu. ft. Reach-In Refrigerated Incubator Chamber with heating / cooling / light option	29 cu. ft. Stability Chamber with heating / cooling / humidity control / light option	11 cu. ft. Stability Chamber with heating / cooling / humidity control / light option
Temperature	Stated values are for applications without light - just temperature / temperature + humidity control		
Temperature range	0°C to 60°C (32°F to 140°F)		
Temp. uniformity @ 20 to 37°C	≤ ±0.3 °C		
Temp. stability @ 20 to 37°C	≤ ±0.1 °C		
	Please refer to changes in temperature values when using light (see next page, section "Performance with light")		
Controller, sensor	Watlow Microprocessor - PID, with RTD sensor		
Display	Digital dual LED, 0.1°C steps readability & setability		
Programmability	Single setpoint, ramp & soak (to 40 steps)		
Temperature safety	Adjustable over- and under-temperature thermostat with analog reference dial, audible/visual alarm		
Compressor	1/4 HP, air-cooled		
Refrigerant	Non-CFC, R-513A refrigerant ; 0.382kg; GWP: 631; CO2e: 0.24t		
Humidity	Stated values are for applications without light - just temperature + humidity control		
Water consumption / specification	N/A	Max. 14 L per day / 3.7 gal per day; demineralizsed water, resistance: 0.5 - 1 MΩ cm	
Input water pressure	N/A	Gravity to 40 psi (2.76 bar)	
Relative humidity range (light off)	N/A	Above ambient to 95% @ 37°C (98.6°F) ±5.0% RH	
Controller, sensor	N/A	Watlow Microprocessor - PID, with capacitive sensor - thin film polymer	
Display	N/A	Digital dual LED, 1% steps readability & setability	
Programmability	N/A	Single setpoint, ramp & soak (to 40 steps)	
Humidity safety	N/A	Audible / visual alarm in case of deviation from setpoint	
Water connection*	N/A	Fill port: 1/8" female NPT, drain port: 3/8" FPT & 3/8" O.D. P-trap right rear, intial fill approx. 1L / 1qt.	
Electrical			
Voltage	120V, 60Hz, 16.0 Amps 3 Wire (including ground)	208-220V, 60 Hz, 15.0 Amps 4 Wire (including ground) single phase	
Plug	NEMA 5-20P	NEMA 14-20P	
Power switch	2-Pole		
Dry contacts	Common, NO, NC		
Data output	4-20 milliamp, temperature	4-20 milliamp, temperature and RH	
Data collection			
Access port	54mm / 2.3 in. diameter; left side; with exterior and interior silicone stopper		

* All models require a drain unless fitted with the optional Thermo Scientific Condensate Evaporator (Cat. No. 1900031). Models 3942 and 3909 also require a constant water source, unless humidity control is not activated.

Specifications, continued

	Forma Vertical Light Reach-In Refrigerated Incubator Chamber	Forma Vertical Light Stability Chamber	Forma Vertical Light Stability Chamber
	Cat. No. 3928	Cat. No. 3942	Cat. No. 3909
Chamber dimensions			
Exterior (W x H x D)	965 x 2248 x 813 mm / 38.00 x 88.50 x 32.00 in.		965 x 1308 x 813 mm / 38.00 x 51.50 x 32.00 in.
Interior (W x H x D)	787 x 1524 x 686 mm / 31.00 x 60.00 x 27.00 in.		787 x 609 x 686 mm / 31.00 x 24.00 x 27.00 in.
Net weight	318 kg / 700 lbs	347 kg / 765 lbs	261 kg / 575 lbs
Shipping weight	386 kg / 850 lbs	472 kg / 1040 lbs	325 kg / 715 lbs
Shelving			
Materials	Solid stainless steel, reinforced		
Number of Shelves: standard / maximum	3 / 16		2 / 9
Shelf size (W x D)	778 x 656 mm / 30.62 x 25.81 in.		
Shelf surface area	0,5 m² / 5.4 ft²		
Load per shelf	15.9 kg / 35 lbs slide in/out; 22.7 kg / 50 lbs stationary; not to exceed 272 kg / 600 lbs total per cabinet		
Performance with light			
Set light and temperature (no humidity control)			
Max. number of light modules	3		2
Temperature range	25°C to 50°C (68°F to 122°F)		10°C to 50°C (50°F to 122°F)
Temp. uniformity @ 20 to 37°C	≤ ±3.0 °C		≤ ±2.5 °C
Temp. stability @20 to 37°C	≤ ±0.3 °C		≤ ±0.3 °C
Set light, temperature, humidity			
Max. number of light modules	N/A	2	
Relative humidity range	N/A	Above ambient to 75% @ 50°C (122°F)	
Humidity stability	N/A	≤ ±5% RH	
Temperature range	N/A	15°C to 50°C (59°F to 122°F)	10°C to 50°C (50°F to 122°F)
Temp. uniformity @ 20 to 40°C	N/A	≤ ±3.0 °C	
Temp. stability @30°C, 75% RH	N/A	≤ ±0.5 °C	
Compliance			
Certifications	cULus		
Medical device	Not registered with FDA, no medical device status		

NOTE: All figures in all tables are typical average values for series devices, based on factory standard following norm DIN12880. Please reference page 25 and/or contact us for certification information or IQ/OQ documents.

For other voltage versions, please refer to the Thermo Scientific Environmental Chamber models, available at thermofisher.com/chambers in relevant countries.
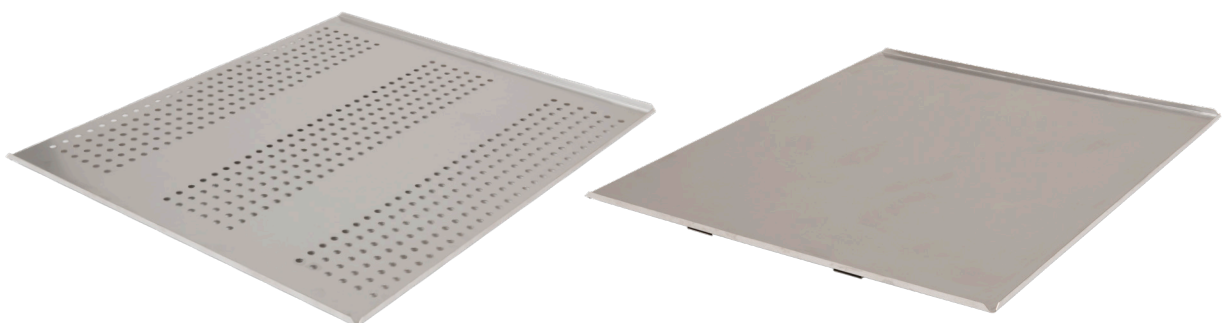
Accessories

Ordering information for chamber accessories and options

All environmental chamber accessories are customer installed unless otherwise indicated.

Product	Description	Compatibility with chamber models	Cat. No.
Shelving – not for shakers			
Stainless steel shelf kit	Additional standard solid stainless steel shelf with channels. For shelf load please refer to chamber specification table	All models	224139
Perforated stainless steel shelf kit	Perforated shelf with channels. For shelf load please refer to chamber specification table. Same load as stainless steel shelf kit	All models	224155
Reinforced stainless steel shelf kit	Reinforced stainless steel shelf and channels; not for shakers 68 kg / 150 lbs load max. with shelf fully inserted and stationary; max amount of shelves per cabinet: 2 in 3960 (300 lbs), 3 in all other models (600 lbs)	All models	224161
Shaker support system –	**Rubber isolators replace casters for maximum stability, factory installed**		
Two shelf shaker support system without duplex outlet	Each shelf will hold 91 kg / 200 lbs. Must be ordered with duplex outlet (505099) for use with models 3920 and 3940; replaces standard shelving	3920, 3940, 3960	1900005
Three shelf shaker support system with duplex outlet	Each shelf will hold 91 kg / 200 lbs. Duplex outlet is included. Replaces standard shelving	3920, 3940	190761
Door options – factory installed			
Lexan™ inner doors kit*	Kit provides five separate inner doors for additional sample protection: 5 separate compartments with use of 5 shelves	3920, 3940, 3960	190239
Door lock assembly	Key door lock for safety and protection	All models	190514
Left-hand door swing kit	Chamber will be delivered with hinge on opposite side. Not available for solid door / solid door with inner glass door	3920, 3940	190597
Solid door large	Outer solid door for large models, heated for reduced condensation	3920, 3940, 3960	1900665
Solid door small	Outer solid door for small models, heated for reduced condensation	3911	1900666
Solid door with glass door large	Outer solid door for large models, heated for reduced condensation - with inner glass door for undisturbed observation of samples	3920, 3940, 3960	1900667
Solid door with glass door small	Outer solid door for small models, heated for reduced condensation - with inner glass door for undisturbed observation of samples	3911	1900668

* Lexan inner doors kit cannot be ordered in combination with inner glass door.

Thermo Scientific Perforated Stainless Steel Shelf (left) and Solid Stainless Steel Shelf (right).

Ordering information for chamber accessories and options, continued

All environmental chamber accessories are customer installed unless otherwise indicated.

Product	Description	Compatibility with chamber models	Cat. No.
Access ports – factory installed			
Port for reach-in refrigerated incubator and stability chambers	1.5 in. (3.8 cm) I.D. Installed on center right wall	3909, 3911, 3920, 3928, 3940, 3942	505101
Port with cover	2 in. (5.1 cm) nominal I.D., installed on center of right side	3909, 3911, 3920, 3928, 3940, 3942	193004
Port with cover	4 in. (10.2 cm) nominal I.D., installed on center of right side	3909, 3911, 3920, 3928, 3940, 3942	193005
Port for reach-in incubator chambers (heat only)	2.4 in. (6.1 cm) I.D., installed on right side below standard port	3960	190164
Reinforced floor options			
Reinforced floor with removable ramp	Accommodates a cell roller. Ramp extends 23.0 in. (58.4cm) in front of the chamber. Customer installed	3920, 3940, 3960	500182
Factory installed reinforced floor with removable ramp	Accommodates a cell roller. Ramp extends 23.0 in. (58.4cm) in front of the chamber. Factory installed	3920, 3940, 3960	190777
Reinforced floor only	Accommodates a cell roller, no ramp included. Customer installed	3920, 3940, 3960	194039
Convenience receptacles – factory installed			
120V Duplex	Includes separate line cord Located on upper rear wall	3920, 3940, 3911	505099
Chart recorders – factory installed			
Left-side open12-in., 6 hour to 31 day digital recorder	Single- or dual-pen option Draw own chart as they record 120V, 50/60 Hz - mounted on left side	3920, 3940, 3911	198036
Right side open 12-in., 6 hour to 31 day digital recorder	Single- or dual-pen option Draw own chart as they record 120V, 50/60 Hz - mounted on right side	3920, 3940, 3911	198039
Top open 12-in., 6 hour to 31 day digital recorder	Adds 20.3 in (51.6 cm) to cabinet height Single- or dual-pen option Draw own chart as they record 120V, 50/60 Hz - mounted on top	3920, 3940, 3911	198042
Single pen 6-in. 7 day recorder	0°C to 60°C (32°F to 140°F) 115V, 50/60 Hz	3920, 3940, 3911	201144
Dual pen 6-in. 7 day recorder	0°C to 60°C (32°F to 140°F) 115V, 50/60 Hz	3920, 3940, 3911	201146
Single pen 6-in. 7 day recorder	0°C to 60°C (32°F to 140°F) 115V, 50/60 Hz	3960	201155
Chart recorders – customer installed			
Single pen 6-in. 7 day recorder	0°C to 60°C (32°F to 140°F) 115V, 50/60 Hz	3920, 3940, 3911	201145
Dual pen 6-in. 7 day recorder	0°C to 60°C (32°F to 140°F) 115V, 50/60 Hz	3920, 3940, 3911	201147

Ordering information for chamber accessories and options, continued

All environmental chamber accessories are customer installed unless otherwise indicated.

Product	Description	Compatibility with chamber models	Cat. No.
Replacement chart paper			
12-in. paper	100 per box	3920, 3940, 3911	197054
6-in. paper	50 per box For Single Pen 0°C to 60°C (32°F to 140°F)	3920, 3940, 3911, 3960	180006
6-in. paper	50 per box For Single Pen 10°C to 70°C (14°F to 58°F)	3920, 3940, 3911, 3960	197030
6-in. paper	50 per box For Single or Dual Pen 0°C to 100°C (32°F to 212°F)	3920, 3940, 3911, 3960	197075
Humidity system options			
Condensate pump kit	Elevated drains, includes separate line cord	3909, 3911, 3920, 3928, 3940, 3942	184062
Condensate evaporator	Evaporates condensate water in labs with no accessible drain. Includes separate line cord	3909, 3911, 3920, 3928, 3940, 3942	1900031
Heatless dryer kit for sub-ambient chamber relative humidity	Requires a minimum air supply of 90 psi capable of 10 cfm. It is recommended that the air supply be greater than the minimum required by the dryer. Factory installed.	3940, 3911	1900139
Carboy kit	Water reservoir for lab installations with no water connection. Carboy to be placed on top of unit, manual refill required.	3909, 3911, 3940, 3942	191596
Deionization cartridge assembly for chambers with humidity and no DI water source			
Cartridge assembly	Includes DI cartridge, wall bracket, pressure regulator and gauge, and 1/4 in. flexible tubing.	3909, 3911, 3940, 3942	019-168-00
Replacement cartridge	Replacement deionization cartridge	3909, 3911, 3940, 3942	585-036-00
Infrared CO_2 control packages – Factory installed			
Infrared CO_2 control package	CO_2 is controlled at user panel	3920	1900226
Infrared CO_2 control package	CO_2 is controlled at user panel	3940, 3911	1900227

The Thermo Scientific Condensate Evaporator is recommended for labs with no accessible drain.

Ordering information for data outputs for the Forma Reach-in Incubator Chamber (heat-only)

The below data outputs are factory installed and compatible only with the Forma Reach-In Incubator Chamber (heat-only) model 3960.

Product	Description	Compatibility with chamber models	Cat. No.
RS-485 interface	Compatible with 1535 monitor/alarm only. Factory installed	3960	190523
4-20 milliamp	Factory installed	3960	190512
0-5V	Factory installed	3960	190543
0-1V	Factory installed	3960	190544

Ordering information for cell roller systems

All cell roll accessories are compatible with the Forma Reach-In Incubator Chamber model 3960. All environmental chamber accessories are customer installed unless otherwise indicated.

Product	Description	Dimensions	Cat. No.
Three-tier roller base	15 positions 120V, 50/60Hz	W x H x D: 29.8 in. x 27.8 in. x 24.4in. (75.7 cm x 70.6 cm x 62.0 cm)	4862
Add-on tier	5 positions, up to 4 tiers can be added to one base. Customer installed	W x H x D: 29.8 in x 7.1 in. x 24.4 in. (75.7 cm x 18.0 cm x 62.0 cm)	186001
Reinforced floor with removable ramp	Factory installed	Ramp extends 23.0 in. (58.4 cm) in front of the chamber	190777
Reinforced floor with removable ramp	Customer installed	Ramp extends 23.0 in. (58.4 cm) in front of the chamber	500182
Rotation alarm system	Includes announcer jack. Customer installed		2288082
Battery back-up	Provides 24 hours of power if a power failure occurs. Customer installed		2288083
Glass bottles	4 per case	110 mm x 285 mm	475560

Ordering information for vertical light chambers

All light modules are compatible with Forma Vertical Light Chamber models 3928, 3942, and 3909. All environmental chamber accessories are customer installed unless otherwise indicated.

Product	Details on fluorescent bulbs	Average illumination on the shelf at 25° C	Cat. No.
All light modules come with 7 fluorescent lights			
Plant growth light module	7 x Osram Fluora Focus on red and blue light waves	8000 lux	50158128
ICH light module*	5 x Osram Biolux, 2 x JUST daylight 6500 Daylight with UV content	9500 lux	50158127
Animal hatching light module	7 x Osram Biolux Daylight	1000 lux	50158129
Light/UV protection	Light/UV protection for operator: Light is switched off automatically when door is opened. Factory installed option. Recommended for ICH.		1900663
Kit replacement bulbs for Plant growth light module	Osram Fluora Focus on red and blue light waves		50158287
Kit replacement bulbs for ICH light module*	Osram Biolux, 2 x JUST daylight 6500 Daylight with UV content		50158286
Kit replacement bulbs for Animal hatching light module	Osram Biolux Daylight		50158288

* Meets ICH guidelines for light stability testing

NOTE: A maximum of 2 light modules fit in a small chamber and 3 light modules fit in a large chamber. Please refer to the specification tables on pages 18-19 for restrictions with humidity control. Please exchange all 7 bulbs at once to help ensure uniform light distribution. No individual bulbs supplied. Light measurements are based on distance of 145 mm/5.51 in (small chamber) and 165 mm/6.5 in (large chamber) between light module and measuring point.

Interior of Forma Vertical Light Chamber with plant growth light modules installed.

Interior of Forma Vertical Light Chamber with animal hatching light modules installed.

Ordering information for reports and certificates

All environmental chamber accessories are customer installed unless otherwise indicated.

Product	Description	Compatibility with chamber models	Cat. No.
Reports and certificates			
Temperature mapping report	15 measurement points. Factory installed	All models	260045
Calibration certificate	Specify test parameters, 1 measurement point temperature and humidity if not specified otherwise. Factory installed	All models	260049

Ordering information for cGxP protocols and onsite validation services

Specification sheets for protocol and validations are available for review upon request*.

Product	Description	Compatibility with chamber models	Cat. No.
IQ OQ			
GLP level protocols		3920, 3928, 3960	IOQDOCE89003499
GLP level protocols		3909, 3911, 3940, 3942	IOQDOCE89003710
GLP level field validation	Performed at customer site, protocol included at no additional charge	3920, 3928, 3960	IOQPCKE89003499
GLP level field validation	Performed at customer site, protocol included at no additional charge	3909, 3911, 3940, 3942	IOQPCKE89003710
IQ OQ PQ			
GMP level protocols		3920, 3928, 3960	IOPQDOCE89003499
GMP level protocols		3909, 3911, 3940, 3942	IOPQDOCE89003710
GMP level field validation	Performed at customer site, protocol included at no additional charge	3920, 3928, 3960	IOPQPCKE89003499
GMP level field validation	Performed at customer site, protocol included at no additional charge	3909, 3911, 3940, 3942	IOPQPCKE89003710

*Environmental chamber pre-sales can be contacted via email at lpg.presales@thermofisher.com.

Warranty

We confidently back our environmental chambers with a two-year parts and labor warranty.

Wireless Data Monitoring

For more information about Thermo Scientific Smart-Vue Sensors and all available data monitoring solutions for temperature, humidity, and light, visit: thermofisher.com/wirelessmonitoring.

Find out more at **thermofisher.com/chambers**

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