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.

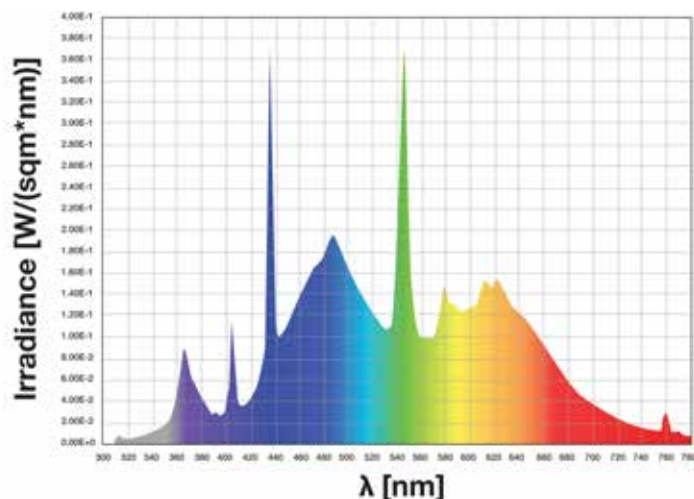Forma Vertical Light Chamber with glass door option and ICH light modules installed.

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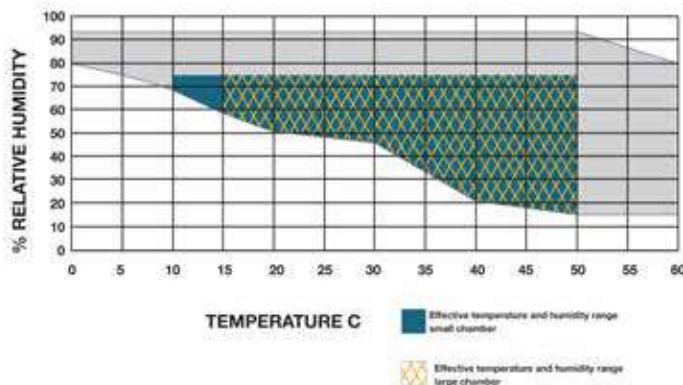
Figure 4. Illustrates the humidity range of the Forma Vertical Light Stability Chamber Models 3942 and 3909 when light is switched on - two light modules installed.

*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.
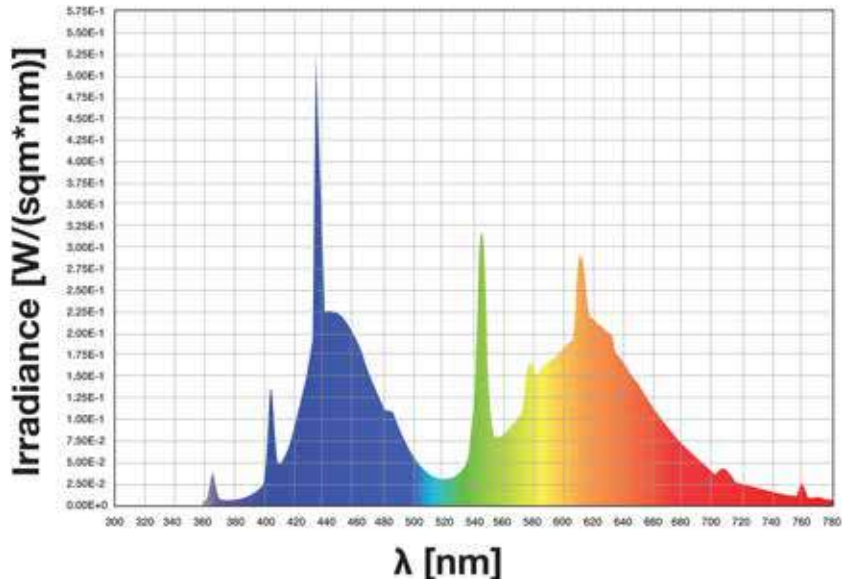

Figure 5. This graph shows the range of the light spectrum inside the Forma Vertical Light Stability Chamber Models 3942 and 3909 when set up with plant growth light modules.

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.

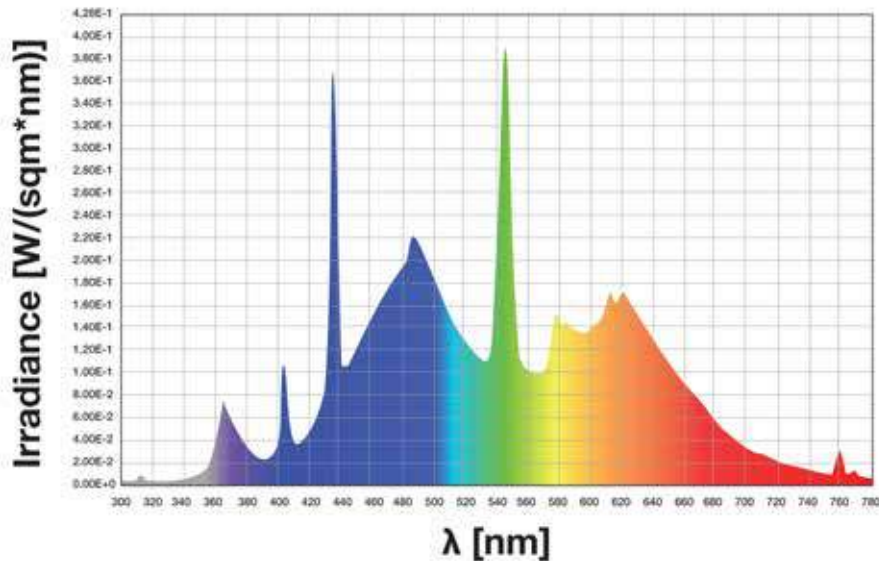Interior of Forma Vertical Light Chamber with animal hatching light modules installed.

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.

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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	$\leq \pm 0.3$ °C		
Temp. stability @ 20 to 37°C	$\leq \pm 0.1$ °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, R134A refrigerant		
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.
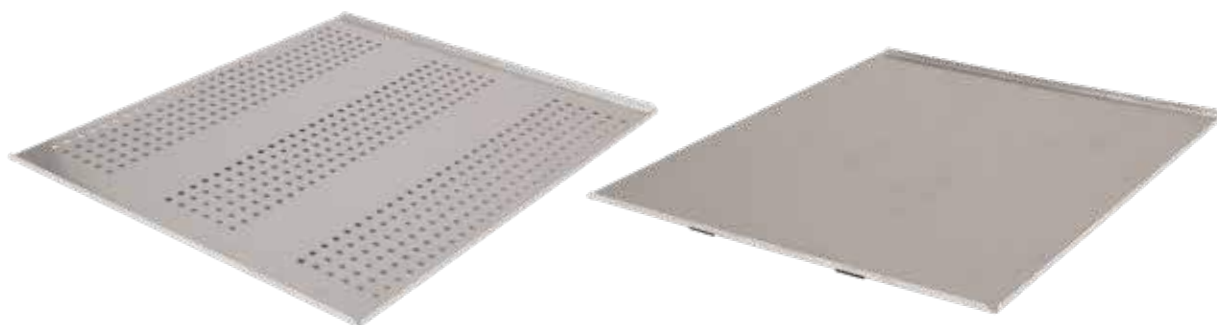
Accessories

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	01916800
Replacement cartridge	Replacement deionization cartridge	3909, 3911, 3940, 3942	58503600
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 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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