



P4900 微型恒温箱剂量计处理系统

技术和使用信息

安装说明:

P4900系统是一个顶部加载的微型恒温箱，它有18个剂量计槽，专门设计用于B3 DoseStix和B3 WINdose剂量计的热处理。铝加热块状恒温箱提供了一种比典型的空气恒温箱更快、更均匀的热处理辐照过的剂量计的加热方法，并且消除了装卸典型的盒状腔体空气恒温箱时遇到的温度波动。

该系统由一个含有18个定制槽的经阳极电镀的铝加热块的加热底座单元和一个可粘帖到恒温箱上或便携实用的倒数计时器组成。底座单元装有一体化的数字温度显示，并有温度控制开关。该单元还装有背部面板插座用于连接到一个可选的可追溯的数字温度表上以便进行对单元的温度控制器(GEX Part# P4901)进行独立再校准。经阳极电镀的铝块与恒温器是分开包装的。将恒温箱放置在平整的平面上，保持周边空气流通顺畅。将铝块插入到恒温箱的大槽内，连接电源线并打开电源开关。初始化完成后，设定温度可以通过一起按住SET与向上箭头或向下箭头来重新调节。

应用:

B3辐照变色薄膜剂量计的热处理是一个推荐使用的，以完成辐照后的颜色的形成并稳定诸如由GEX公司生产的B3 DoseStix和WINdose剂量计产品。控制的测试结果证实：一个有效的辐照后热处理过程将完成B3剂量计辐照的颜色形成并使得它们在室温储存条件下保持稳定长达一年或更久的时间。

GEX开发了P4900微型恒温箱剂量计颜色形成系统，它专门用于B3 DoseStix和WINdose剂量计在它们的各个产品包装里的热处理。P4900系统在其加热块的每个包装槽里提供了高度一致的温度条件 ($\pm 0.5^\circ\text{C}$)。

P4900颜色形成系统可以被进一步地扩展，通过增加可选的P4901数字温度计以校准系统控制器的温度和可选的P4902温度探头来测试加热块的18个槽中的任何一个的温度。

对于所有的GEX公司的B3 DoseStix和WINdose剂量计产品包装，当温度设定为 58.5°C 时，GEX推荐使用的设定时间为5分钟。

P4900的热处理过程在提供完整的颜色形成并使得B3 DoseStix和WINdose剂量计保持稳定的有效性可以通过一个简单的测试得到确认。以任何介于5-15 kGy相同的剂量辐照32个或更多的B3剂量计，以 58.5°C 热处理已辐照的剂量计5分钟并记录测量结果。每隔一定的时间间隔再测一次剂量计组并与最初的测试结果比较以证实它们随时间的稳定性。

GEX的数据显示，经恰当热处理的B3 DoseStix和WINdose剂量计在室温下将保持稳定长达一年或更久的时间。

如果需要确认P4900是否等同于现存的箱式空气恒温箱，另一组经相同剂量辐照的剂量计可以放置在箱式恒温箱里在经检定的设定温度下进行热处理，以和P4900处理的样品数据比较是否一致。

校准:

各个公司的标准操作程序都将规定各设备的校准周期，典型的行业惯例如下:

- ⊕ **恒温箱** – 使用GEX P8003不可逆温度标签或等同物贴在B3剂量计包装上；另一种选择是，使用恒温箱外罩背部面板连接端子连接一个经校准的温度探头。
- ⊕ **定时器** – 以一定周期的时间间隔校准，或更换时校准。

保修:

薄膜颜色形成系统提供一年厂家质保期。用户变更将使保修失效并由用户承担相应的责任。更多详情请参考制造商保修信息。贴有Hybex标签的P4900是SciGene, Inc., Sunnyvale, CA.的产品，由GEX承担分销。有关售后保修和技术支持请联系GEX公司。

规格参数:

恒温箱

电源	115V or 220V AC; 250 W
重量	5.2 lbs (2.4 kg)
占用空间	6" x 12" (14 cm x 30 cm)
温度范围	环境+ 5°C to 99°C
温度调节	$\pm 0.2^\circ\text{C}$
升温时间	$>5^\circ\text{C}/\text{min}$
温度控制器	数字PID, 单回路
温度显示	实际或设定温度LED
温度计输出	T型热电偶

铝加热块

机械	经阳极电镀的铝
	18个可用于WINdose或DoseStix剂量计槽
	2.5"H x 3"W x 6"L
	4.82 lbs (2.2 kg)
	底部可卸下清洁
温度均匀性	$\leq 0.5^\circ\text{C}$

定时器

尺寸	1.125" x 2.44"
报警	有声



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功能	倒数, 正数, 时钟, 秒表, 记忆
显示	1/2" H, 6位LCD
分辨率	1 秒
范围	24小时到 1 秒
精度	0.01%
重量	< 1 盎司 (< 16 g)

Installation Instruction:

The P4900 system is a top loading micro-incubator with 18 dosimeter wells designed specifically to heat treat B3 DoseStix and B3 WINdose dosimeters. The aluminum heating block incubator provides a faster, more uniform heating method of heat treating irradiated dosimeters than a typical air incubator and eliminates the temperature swings experienced while loading and unloading a typical box cavity air incubator.

The system is comprised of a heating base unit that houses the custom 18 well anodized aluminum heating block and a countdown timer that can be affixed to the incubator or used portably. The base unit has an integrated digital temperature display with temperature control and on/off switch. The unit is equipped with back panel jack for connection to an optional traceable digital thermometer for an independent recalibration of the unit's temperature controller (GEX Part# P4901). The anodized aluminum block is packaged separately from the incubator. Place the incubator on a flat, even surface, with unobstructed airflow around the incubator. Insert the aluminum block into the large well in the incubator. Connect the power cord and turn the unit on. After initializing, the set temperature can be readjusted by pressing SET and UP or DOWN arrows together.

Application:

Heat treatment of B3 radiochromic film dosimeters is a practice recommended to complete post irradiation development and stabilize B3 Dosimeters such as B3 DoseStix and WINdose dosimeter products manufactured by GEX. Controlled test results verify that an effective post irradiation heat treatment process will complete any post irradiation color development of B3 dosimeters and render them shelf stable for a period of one year or more when the dosimeters are stored at room temperature.

GEX developed the P4900 Micro Incubator Dosimeter Development System specifically for heat treatment of B3 DoseStix and WINdose dosimeters in their individual product packages. The P4900 system provides highly uniform temperature conditions (± 0.5 °C) within each package slot in the heat block.

The P4900 Development System can be further expanded by adding the optional P4901 Digital Thermometer to calibrate the system controller temperature and optional P4902 temperature probe to test the temperature in any of the 18 wells of the heating block.

GEX recommends using a time setting 5 of minutes at 58.5 °C with all GEX B3 DoseStix and WINdose dosimeter product packages.

The effectiveness of the P4900 heat treatment process in providing complete color development and rendering B3 DoseStix and WINdose dosimeters shelf stable can be verified with a simple test. Irradiate 32 or more B3 dosimeters to a uniform dose anywhere between 5-15 kGy. Heat-treat the irradiated dosimeters for 5 minutes at 58.5 °C and record the measurements. Re-measure the dosimeter set at periodic time intervals to evidence their stability over time compared with the results of the initial test.

GEX data suggests properly heat treated B3 DoseStix and WINdose dosimeters will remain stable for one year or longer when stored at room temperature.

If there is a need to verify that the P4900 is equivalent to an existing box air incubator, a second set of dosimeters irradiated to the same dose can be put through the box type incubator for heat treatment under its qualified settings to compare with the P4900 sample data for equivalence.

Calibration:

Individual company standard operating procedures will dictate the frequency of calibration of the components. Typical industry practices are:

- ❑ **Incubator** – Use GEX P8003 irreversible thermal labels or equivalent on the B3 dosimeter packages. Alternatively, use the incubator housing back panel connection to attach a calibrated temperature probe.
- ❑ **Timer** – Calibrated at periodic intervals, or at replacement.

Warranty:

The film development system is supplied with a one year manufacturer's warranty. User modifications are not warranted and are the sole responsibility of the user. See the manufacturer warranty information for more details. The P4900 is provided to GEX for resale under the Hybex label owned by SciGene, Inc., Sunnyvale, CA. Please contact GEX for after sale warranty and technical support.



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Specifications:

Incubator

Electrical	115V or 220V AC; 250 W
Weight	5.2 lbs (2.4 kg)
Footprint	6" x 12" (14 cm x 30 cm)
Temperature Range	Ambient +5 °C to 99 °C
Temperature Regulation	±0.2 °C
Heat up Time	>5 °C/ min
Temperature Controller	Digital PID, single loop
Temperature Display	Actual or Set Temperature LED
Thermometer Output	T-type Thermocouple

Aluminum Heating Block

Mechanical	Anodized Aluminum 18 WINDose or DoseStix capacity 2.5"H x 3"W x 6"L 4.82 lbs (2.2 kg) Demountable Bottom for Cleanup
Temperature Uniformity	Less than or equal to 0.5 °C

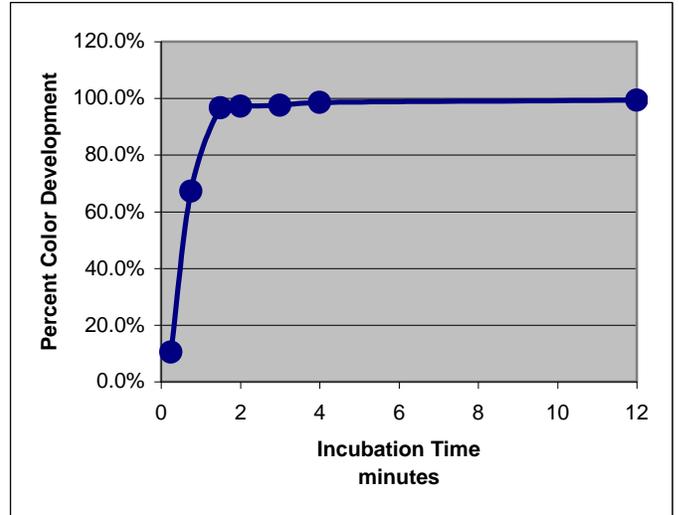
Timer

Size	1.125" x 2.44"
Alarm	Audible
Functions	Count-down, Count-up, Clock, Stopwatch, Memory
Display	1/2 "H, 6-digit LCD
Resolution	1 sec
Range	24 hrs to 1 sec
Accuracy	0.01%
Weight	Less than 1 oz (less than 16 g)

Note: Al holder block shown outside of the incubator is shown as visual aid. The aluminum block is maintained inside the main cavity of the incubator at all times and is only removed for periodic cleaning. Turn the power off when block is removed from the incubator's cavity.

Heat Treatment Method Comparison

Results are shown of testing of the P4900 Micro-Incubator Dosimeter Development System against a qualified post irradiation heat treatment process using a Fisher Isotemp Model 637D Incubator.



Graph depicts results obtained with the P4900 unit set to temperature of 58.5 °C for various time periods plotted as a percent of B3 dosimeter color development compared against the results obtained from a 15 minute 58.5 °C Fisher box air incubator cycle.

