

IONIZATION CHAMBERS

电离室

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There are many different designs of ionization chambers for the measurement of airborne tritium and other radioactive gases.

有许多不同款式电离室用来测量气氚和其它辐射气体

OTC has designed and built many different ionization chambers, of different sizes and configurations, each of which was optimized for some specific purpose. OTC ionization chambers have been used not only for room air monitoring, but for glove boxes, process piping, gas chromatographs, and for challenging environments such as nuclear power plants. OTC ionization chambers span all sensitivities, from 10^{-7} Ci/m³ to pure tritium. They can be used to selectively measure tritium, or only its oxide, even in the presence of other radioactive gases. OTC ionization chambers are designed for easy assembly and maintenance.

OTC设计并组建许多不同电离室，不同规格与结构，每一款根据具体目的进行了优化，OTC电离室不仅用于室内空气监测，还可用于手套箱，工艺管道，和气相色谱，及具有挑战性的环境，如核电站。OTC电离室满程灵敏度，从 10^{-7} Ci/m³到纯氚。可以被选择性的用于测量氚，或其氧化物，即使在其他辐射气体出现的情况下。OTC电离室设计容易组装和维护。



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An ionization chamber is an electrically closed vessel containing an internal electrode. An electric field is applied between the wall of the chamber and the electrode, so that the ionization produced by radiation is collected in the form of a current. In a linear ionization chamber, the current is proportional to the internal radioactivity, and is essentially independent of the chamber's electric field potential.

电离室为带内部电极电气密封容器，室壁和电极之间产生电场，以便辐射产生的离子被以电流形式收集，在线性电离室中，电流与内部活度成正比且完全独立于电离室的电场电位。

INTERCHANGEABILITY

可兼容性

All OTC ionization chambers have been designed so that the electrometer preamplifiers are located in a cavity in the mounting flange. Measurement (tritium) calibration is located directly at the ionization chamber-electrometer module so that, in general, any ionization chamber-electrometer module will function in combination with any main electronics cabinet, and still maintain instrument calibration. It is therefore possible to use one or several different ionization chamber-electrometer modules with any given main electronics system.



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所有OTC电离室都经过设计，以便静电计前置放大器位于安装法兰的腔内，测量/校准（氚）直接放置于电离室静电计模块中，一般说来，电离室-静电计模块与任意主电子机柜一同使用无需再校准。因此，可以将一个或几个不同电离室-静电计模块与任何主电子学系统一同使用。

NON SPECIFIC RESPONSE 非特异性反应

Ionization chambers respond not only to the airborne isotope inside the chamber, but will also respond to ionization produced inside the chamber by external gamma, X-rays and cosmic ray fields.

电离室不仅对室内气溶胶同位素反应，也对由于外部的 γ ，X和宇宙射线场在电离室内产生的离子响应。

GAMMA COMPENSATION 伽马补偿

To overcome undesirable effects due to external gamma fields, OTC tritium monitors can be supplied with compensating ionization chambers. Here, a second ionization chamber of identical dimensions is used to cancel the effects of external radiation upon the measuring ionization chamber. Additional gamma radiation suppression by means of lead shielding can be supplied.

为了克服由于外部伽马场产生的不良的影响，OTC氚监测器可以配备补偿电离室。同样尺寸的第二电离室用来取消外部辐射对测量电离室的影响，也可提供铅屏方式进行伽马辐射抑制。

LINEARITY 线性

OTC ionization chambers are designed to be highly linear. At high radiation activity levels, it becomes increasingly probable that an ion and an electron will recombine, will be lost and not form part of the ion current collected by the electrode. Special electrode and chamber designs help to reduce this effect.

OTC电离室设计为高线性，在高辐射活度水平情况下，离子和电子极有可能重新结合并丢失而不能形成被电极收集的电子流，特别的电极和电离室设计有助于减少这种影响。

KANNE DESIGN KANNE设计

Most OTC ionization chambers utilize the Kanne configuration, where the ionization chamber is surrounded by a closely spaced second chamber. The volume between the two surfaces serves as an ionization trap. To prevent build-up of debris in the ionization trap, or within the active volume of the ionization chamber, it is normal to use a high efficiency dust filter ahead of the ionization trap. 大多数OTC电离室使用Kanne结构，电离室外面包着一个紧密间隔的第二层室，



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二者表面之间的空间用作离子阱。为了防止碎片在离子阱中或电离室的有效容积中积累，正常在电子阱之前使用一个高效滤网。

CONFIGURATION

结构

Design of every ionization chamber system has been optimized both for performance as well as for economy. Low level ionization chambers are at least 2 liters in overall volume, are often lead shielded and in a gamma compensation (dual) configuration. High level ionization chambers are generally small and employ closely spaced large diameter electrode configurations to minimize nonlinearities. Glove box ionization chambers employ perforated walls for direct intrusion into the glove box, thereby eliminating the need for pumps and plumbing.

每一个电离室系统设计在性能和经济方面实现了优化，

低限电离室总体积至少2L，常带铅屏，且伽马补偿结构（双室）

高量程电离室通常小巧，配有紧凑间距大直径的电极结构以减少非线性。
手套箱电离室使用打孔壁以便直接进入手套箱，因而不再需要泵和管线。

CONSTRUCTION AND MATERIALS

建设和材料

Most OTC ionization chambers are secured to a massive flat "baseplate" which serves not only as a mounting structure, but which also houses the electrometer. Calibration of the entire system is rendered directly at the electrometer via trimmer potentiometers accessible in the side of the ionization chamber mounting flange. This permits interchange of ionization chamber modules without loss of instrument calibration. Dual ionization chambers consist of an identical pair of chambers, mounted on either side of the baseplate which houses the electrometer.

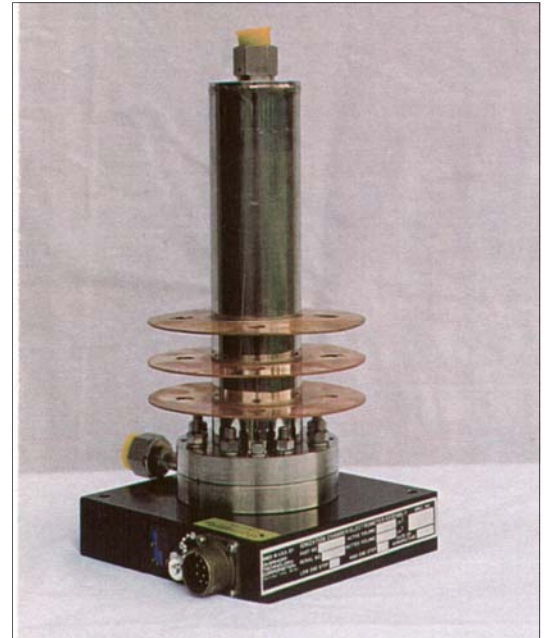
大多数OTC电离室都固定在一个大平底盘上，这个底盘既用作安装结构，又是静电计外壳。整个系统校准通过通过电离室安装法兰一侧的微调电位计静电计直接完成。这样在保证仪器标定的同时允许电离室模块更换。双电离室由一对同样的室组成，焊接在装有静电计的底盘两侧。

Stainless steel or aluminum is commonly selected, although copper and brass can also be used. Insulators generally are chosen to be inert to radiation, but the insulator for the ionization collecting electrode is almost always (except for ultra high levels) chosen to be fabricated from PTFE. All commonly used inch or metric fittings and hose bars can be supplied.

通常选料为不锈钢和铝，尽管也用铜和黄铜。绝缘体通常选对辐射惰性材料，但是对于离子收集电极的绝缘体几乎总是PTFE。
可提供常用的标准件和软管倒钩接头。

CHAMBER MODELS

电离室型号



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SOME AVAILABLE CONFIGURATIONS

一些可供选择的结构

2 Liter Ionization Chamber (2LS)

2升电离室

Single or dual, mounted onto 7" square baseplate. Total wetted volume is 2,000 cc with an active internal volume of 1,600 cc, and volume of about 400 cc in the ionization trap. Supplied with two Swagelok or hose barb fittings.

单/双，安装到7"方形底盘上，总湿容积2,000 cc，有效内部容积1,600 cc，电子阱容积大约400cc。带2个Swagelok软管倒钩连接件。

OTHER STANDARD SIZES

其它标准型号

Ionization Chambers with volumes of 500 cc, 200 cc, or 20 cc

容积500 cc, 200 cc, 或 20 cc电离室

Single or dual, mounted onto 7" square baseplate. These chambers are generally used for process monitoring and are sometimes built with matching gamma compensation chambers. Supplied with two Swagelok fittings.

单/双，安装到7"方形底盘上，这些电离室通常用于过程监控，有时和匹配的伽马补偿室组建在一起，带2个Swagelok连接件。

Perforated Wall Ionization Chambers

(2LPW, 200PW)

打孔壁电离室(2LPW, 200PW)

Available in a nominal 2 liter and a 200 cc configuration, these ionization chambers have perforated walls, allowing free passage of the surrounding atmosphere. Pumps are obviously no longer required for these ionization chambers.

供应正常2L和200 cc结构，这些电离室有打孔壁，允许周围气体自由通过。当然这些电离室就不需要泵了

Suitable for area monitoring, these chamber should be covered with light tissue to act as a dust filter when they are exposed to particulate laden air.

适用于区域监测，这些电离室暴露在充满尘粒的空气时应该用轻薄纸覆盖，像除尘网一样。

8 LITER IONIZATION CHAMBER

8L电离室

Dual or quadruple ionization chambers for ultra low level tritium specific monitoring. Measurement as low as 10^{-7} Ci/m³ can be made with these large ionization chambers. Mounted onto a 12" square baseplate, total wetted volume is 11,240 cc with an active internal volume of 6,500 cc. Supplied with two Swagelok hose barb fittings.

双/四电离室用于极低值氚特别监测。

这些大容量电离室可测量低到 10^{-7} Ci/m³，安装到12"底盘上，总湿量11,240 cc，有效内部容量6,500 cc，带2个Swagelok软管倒钩连接件。

IONIZATION CHAMBERS FOR TRITIUM SPECIFIC MEASUREMENTS

氚专用测量电离室

Specific tritium only measurements are made possible through the use of drying systems or permeation



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tubes which segregate tritium oxide from all other radioisotopes. Use of such separation methods permit measurement of tritium in any of its forms, that is, **HT, HTO**, or total tritium.

通过干燥系统或渗透管将氚氧化物同其它辐射同位素分隔开来，这样可以测量特定形式的氚。

使用这种方法可测量任何形式的氚，即 **HT, HTO**，或总氚

CRUCIFORM CHAMBERS FOR COMPLETE GAMMA COMPENSATION

十字电离室用于完整伽马补偿

Response to external gamma fields with high gradients is almost totally eliminated through the use of four identical ionization chambers nested in a cruciform pattern. Two chambers are used for measurement, the other two, diagonally opposite, are used for gamma compensation.

对带高梯度的外部伽马场响应通过使用十字形排列的四个相同的电离室伽马影响几乎完全消除。两个室用于测量，另外斜对角的两个用于伽马补偿。

MORE IONIZATION CHAMBER OPTIONS TRITIUM SPECIFIC MEASUREMENTS CRUCIFORM CHAMBERS

更多电离室选择，氚专用测量十字形排列电离室

PLATE-OUT PROOF CHAMBERS

防污电离室

Contamination from plate-out HTO is reduced by use of a specially designed ionization chamber which replaces the regular inner chamber in a standard Kanne design. Tests have shown that an improvement of up to three orders of magnitude is reached using this design.

通过使用特别设计的电离室替换常规的标准Kanne型内室，减少污染。测试表明使用这种设计能改进到3个数量级。

PURGING IONIZATION CHAMBERS

电离室吹扫

Traces of HTO that have caused plate-out inside ionization chambers can often be removed by purging the ionization chambers with clean air.

由电离室内部分沉淀的污染引起的 HTO 积累可通过用干净空气吹扫电离室清除

SPECIFYING IONIZATION CHAMBERS

专用电离室

OTC manufactures a wide variety of single, dual or multiple ionization chambers in sizes from 10 cc to 8 liters.

OTC生产各种单/双/多电离室，规格10cc-8L

Ionization chambers are available in versions with wire grids (for low plate-out), perforated walls, or as otherwise required.

拉丝式电离室，孔壁式电离室或其它要求的电离室

MODELS

型号

dual ionization chambers for tritium specific measurement in the presence of other

IDENTIFICATION CODE



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radioactive gases HTO

双电离室在有其它辐射气体出现时专门用于测氙

20 cc single ionization chamber	20 CCS
20cc 单电离室	
200 cc single ionization chamber	200 CCS
200cc 单室	
500 cc single ionization chamber	500 CCS
500cc单室	
2 liter single ionization chamber	2 LS
2L单室	
2 liter dual ionization chamber	2 LD
2L双室	
2 liter quad ionization chamber	2 LQ
2L四室	
8 liter single ionization chamber	8 LS
8L单室	
8 liter dual ionization chamber	8 LD
8L双室	

remote location of chamber ICR

遥控室ICR

perforated wall PW

孔壁PW

wire grid

拉丝

WG

Materials of construction of ionization chambers and attached base plates are listed:

电离室和附带底盘建造材料

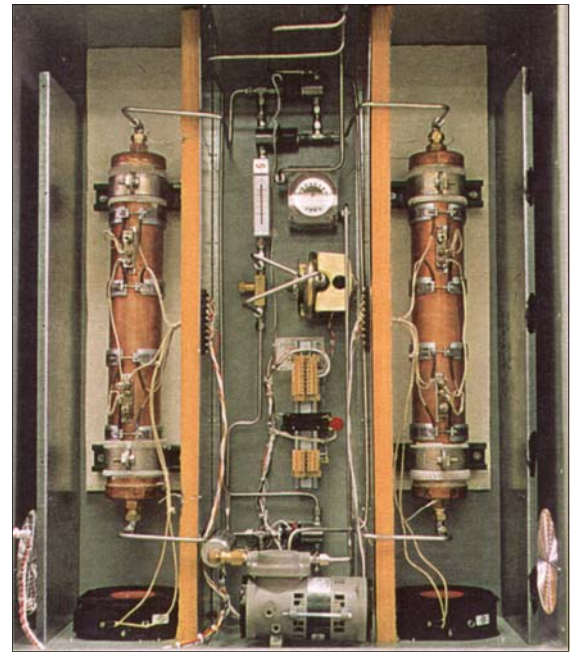
aluminum	AL
铝	
brass	BR
铜	
stainless steel	SS
不锈钢	

SPECIAL IONIZATION CHAMBER OPTIONS

特殊电离室选择

For most applications, standard single or dual 2 liter ionization chambers are used. Many other special ionization chamber configurations are available. Consult the factory for details and prices.

大多数情况下使用标准单/双 2L 电离室。许多气体专用电离室构造也有供应，详情和价格咨询工厂。



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