



VEERTEK

让短路电池&漏液电池无处遁形

Making Short-circuit & Leak Battery

Nowhere to Hide

深圳维泰克智能仪器有限公司
SHENZHEN VEERTEK INTELLIGENT INSTRUMENT CO., LTD

🌐 www.veertek.com

☎ 0755-28283466

✉ Venus.lee@veertek.com

目录

CONTENT

1. 公司简介 About Us	2
2. 发展历程 Historyt	3
3. 企业资质 Our Qualification	3
4. 专利与认证 Patents & Certifications.....	4
5. 四级杆质谱分析仪及其工作原理 Quadrupole Mass Spectrometer & Working Principle.....	5
6. 锂电池漏液VOCs检测仪及其工作原理 VOCs Detecor for Battery Leak & Working Principle	11
7. 绝缘脉冲测试仪及其工作原理 Insulation Impulse Tester & Working Principle	15
8.我们的客户 Our Clients	21

公司简介

ABOUT US

深圳维泰克智能仪器有限公司（简称VEERTEK/维泰克）是一家深度专注于新能源锂电池制程安全管控的智能仪器公司。
Shenzhen Veertek Intelligent Instrument Co., Ltd is an intelligent instrument company deeply focused on the safety control of lithium battery.

VEERTEK的脉冲式绝缘检测技术、低浓度VOC气体检测技术、四极杆质谱分析技术为锂电池客户在其生产过程中遇到的电池短路和漏液等行业痛点问题，提供了有效的管控方案，且已在业内得到广泛地推广和应用，成为电芯&Pack厂产线安全管控不可或缺的环节。

VEERTEK's Insulation Impulse Testing technology, low concentration VOCs Gas Detection technology and Quadrupole Mass Spectrometry for Residual Gas Analysis provide effective safety control solutions for the customers in terms of the production process.

VEERTEK团队核心成员中有多名锂电池专家、PID光离子化技术专家和质谱分析技术专家，公司始终聚焦新能源锂电安全监测领域核心技术的创新与进步，是一家对锂电池及其生产工艺有着深刻理解和研究的仪器仪表公司。

The core team members of the company include lithium battery experts, PID experts and mass spectrometry experts.

The company has always focused on innovation and progress in core technologies in the field of new energy security monitoring. It is a company with deep understanding on lithium battery and its production process.

VEERTEK致力于成为新能源安全检测领域最有影响力的全球化企业，公司始终秉承“技术引领、勇于创新、客户至上、诚实守信”的核心价值观，凭借夯实的专业知识和丰富的行业经验，为全球客户提供最具价值的产品、解决方案和专业服务，为智能化时代人们对工作和生活环境更高的安全需求提供切实保障。

Adhering to the core values of "Technology Guidance, Innovation, Customer First, Honesty & Trustworthiness", VEERTEK is committed to becoming the most influential global enterprise in the field of new energy security detection.

发展历程 HISTORY

- 2011** 母公司香港長注国际推出了用于锂电池微短路检测的绝缘脉冲技术
Wellspring Internatinal HK, the parent company of VEERTEK, has developed an insulation impulse technology for the detection of micro-short circuits of lithium batteries
- 2012** 在国内组建技术支持和售后团队
Setting up technical support team and after-sales team in China Mainland
- 2013** 全球首家开发出基于PID光离子化技术的锂电池漏液检测方案
Developed a lithium battery leak detection solution based on Photo-ionization technology worldwide initially
- 2014** 为全球最大消费类锂电公司提供漏液检测方案
Providing battery leak detection solution for the world's largest 3C lithium battery company
- 2017** 为应对国内锂电市场的迅速发展，在深圳正式成立VEERTEK，并将锂电安全管控类的仪器研发、生产、销售、售后业务划归其下
VEERTEK was formally founded in Shenzhen in response to the rapid development of the domestic lithium battery market, and the comany is responsible for R&D, production, sales and after-sales of battery safety control instruments
- 2018** 成为全球最大的手机终端巨头锂电池漏液检测直接供应商
Be the direct supplier of battery leak detection for the world's largest mobile phone giant
- 2019** 为全球最大电动汽车制造商提供基于四级杆质谱技术的电池漏液检测方案
Providing the world's largest EV car manufacturer with a battery leak detection solution based on quadrupole mass spectrometry technology
- 2020** 公司研发中心入驻中粮祥云广场甲级写字楼
VEERTEK's R&D center settled in COFCO Xiangyun Plaza
- 2021** 开发出超大量程的绝缘脉冲测试仪用于储能电池客户短路检测需求
Developed an ultra-large range insulation impulse tester for shor-circuit detection for ESB customers
- 2022** 首条四级杆质谱生产线投入运营
The first quadrupole mass spectrometry production line was put into operation
- 2025** 开发具备深度AI智能学习功能的第三代的绝缘脉冲检测技术
Developing the third generation of insulation impulse detection technology with AI intelligent learning function

企业资质 | OUR QUALIFICATION



High-tech Enterprises



Specialized, Refined & Innovative Enterprises



Innovative Small & Medium-sized Enterprises



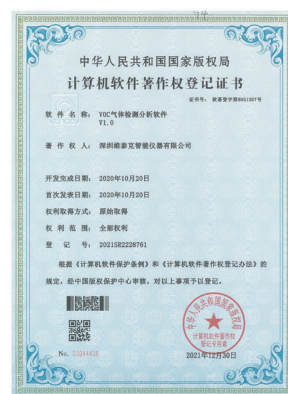
Technology Oriented Enterprises



Key Enterprises of Shenlong Talent Plan

专利与认证

PATENTS & CERTIFICATIONS



四极杆质谱分析仪及其工作原理

Quadrupole Mass Spectrometer for RGA



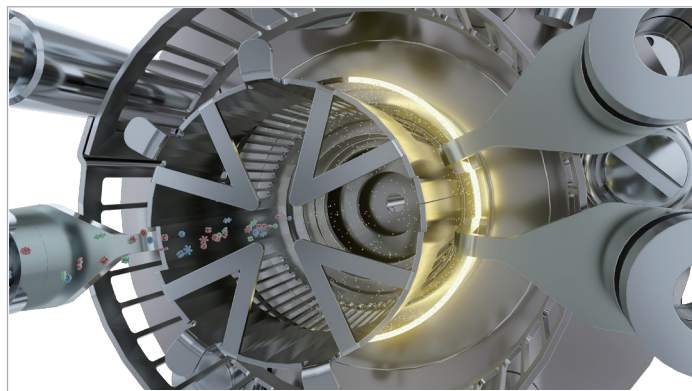
适用于钢壳电池、方形铝壳电池、刀片电池、电池模组及电池包等产品的漏液检测和电池水含量检测
Suitable for leak detection of cylindrical, prismatic, blade battery, module and pack etc and water molecule detection of battery.

产品特点 / Product Features

- 最小可检漏率为 $1 \cdot 10^{-7} \text{mbar} \cdot \text{l/s}$
Minimum leak detection of $1 \cdot 10^{-7} \text{mbar} \cdot \text{l/s}$
- 抗干扰强
Strong anti-interference ability
- 更适合电池模组、电池包漏液检测
Suitable for detecting leak in battery modules & packs
- 易于集成至自动化产线
Easy to be integrated into automated production line

产品参数 / Specifications

传感器类型/Sensor Type	四极杆质谱/Quadrupole Mass Spectrometry
质量数范围/Mass Number Range	1-100 amu
最小可检漏率/Minimum Detectable Leak Rate	1x10 ⁻⁷ mbar·l/s
工作温度/Temperature	10°C–40°C
最大工作压强/Maximum Operating Pressure	5E-4 Torr
电源输入/Power Input	100-240V (AC)
尺寸/L*W*H	615 x 358 x 274mm
串行接口/Serial Interface	USB 2.0; M12 (用于连接I/O1000模块); RJ45 (网络连接)
I/O1000模块接口/Interface of the I/O1000 Module	1 0路数字量输入; 8路数字量输出; RS232 1 0 Channel Digital Input; 8-way Digital Output; RS232
重量/Weight	68Kg
质保/Quality Guarantee	1 Year



离子源 / Ion Source



四极杆电场 / Electric Quadrupole Field

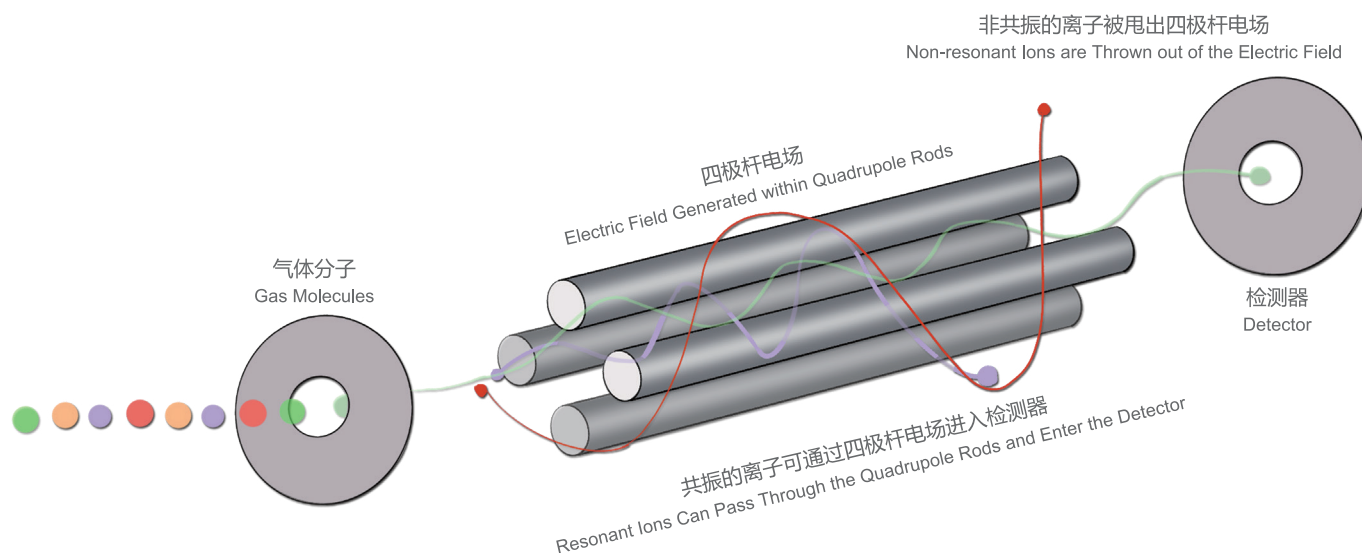
四极杆质谱分析仪及其工作原理

Quadrupole Mass Spectrometer & Working Principle

工作原理 / Working Principle

四极杆质谱仪中的所有组件都需要高真空才能正常工作。

All components in a Quadrupole Mass Spectrometer require high vacuo function.

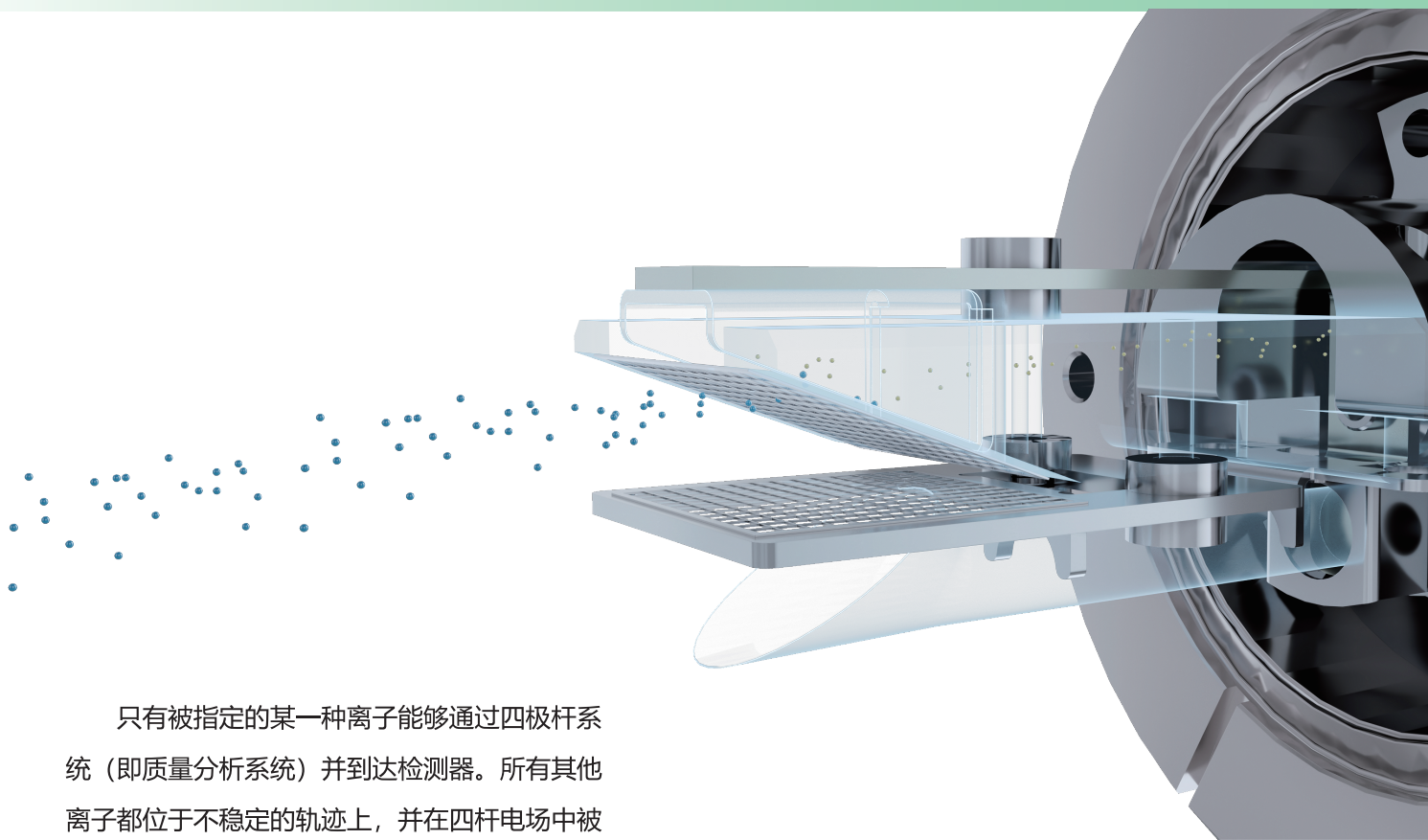


进入仪器的中性气体分子首先在离子源中被电离，以这种方式产生的离子在经过仪器提取后进入带有四极杆电场的质量分析器。

The neutral gas particles are ionized in the ion source when they enter into the QMS. Ions generated in this way pass through extraction lenses before entering the analyzer with its electric quadrupole field.

四极杆质谱仪利用包括交流电压和直流电压分量的电压，在四根高精度金属杆内产生电场。这个四极电场便是仪器根据离子的质量电荷比来辨别和筛选离子的地方。

Using voltage comprising both an alternating and direct voltage component, an electric field is generated within 4 high-precision metal rods. This quadrupole field is where ion discrimination takes place on the basis of their mass-to- charge ratio.



只有被指定的某一种离子能够通过四极杆系统（即质量分析系统）并到达检测器。所有其他离子都位于不稳定的轨迹上，并在四杆电场中被甩出去。

Accordingly, only ions of one species are able to pass through the rod system and reach the detector. All other ions are located on unstable trajectories and are discriminated in the apparatus.

四极杆质谱仪的检测器是一个被称为法拉第杯的导电中空体。在法拉第杯中，离子被电荷中和，其运动产生的电流信号可被检测器捕捉到。

The detector in its simplest form is an electrically conductive hollow body known as a Faraday cup. The ions are neutralized by the release of charges and the resulting current is detected. enter into the QMS . Ions generated in this way pass through extraction lenses before entering the analyzer with its electric quadrupole field.

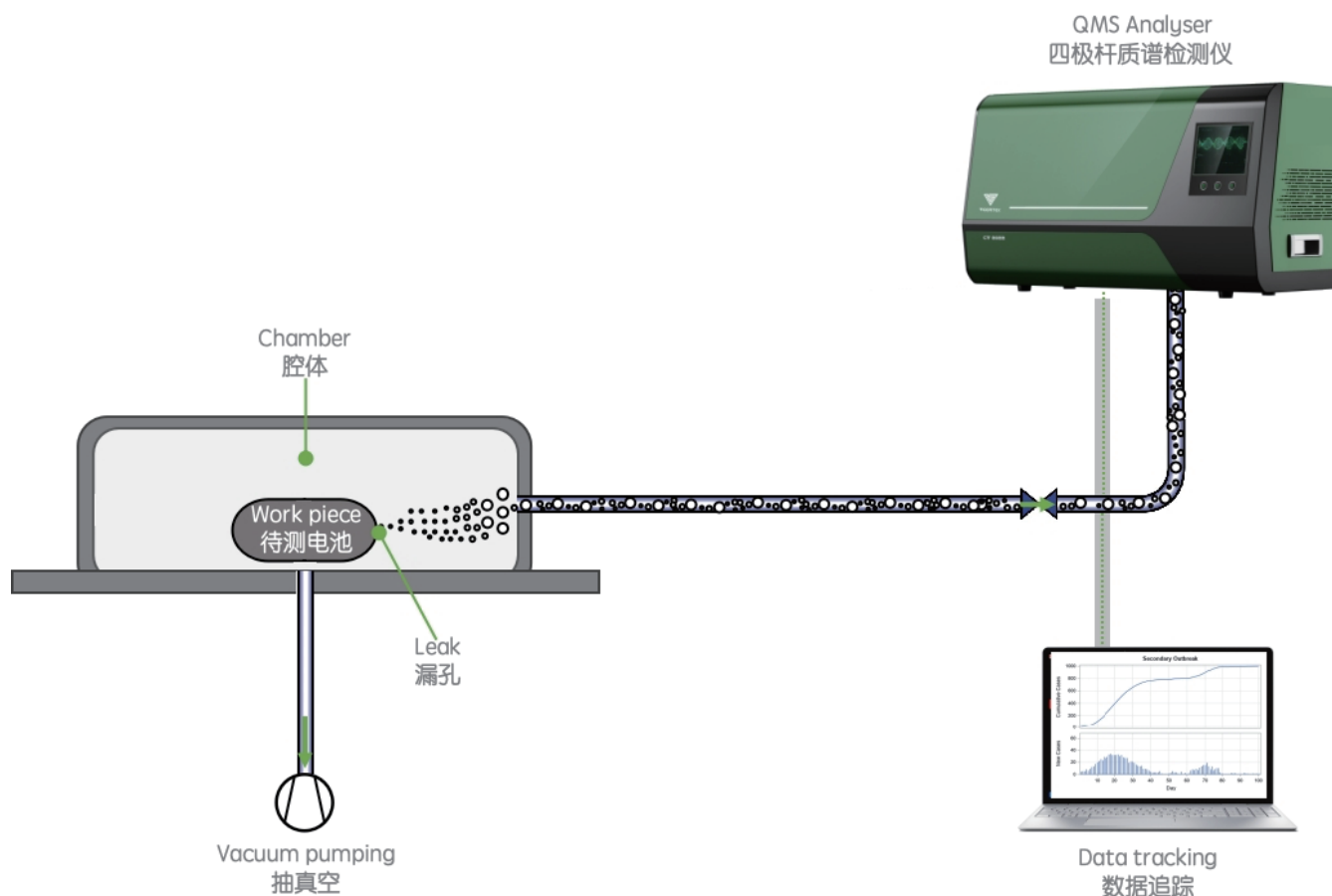
就信号强度而言，法拉第杯足以在高真空中对残余气体进行检测分析。当存在非常小的离子电流时，如在超高真空范围内，或需要非常快速的测量时，通常使用二次电子倍增器(SEM)。利用这样的质谱设置，用户可以检测到哪些物质仍然存在于真空系统中。

A Faraday cup is sufficient in terms of signal strength to perform a residual gas analysis in high vacuum. Where very small ion currents are present, as in the ultra-high vacuum range, or where very fast measurement is required, a secondary electron multiplier (SEM) is normally used. Utilizing a mass spectrometric setup such as this, the user can detect which substances are still present in the vacuum system.

四极杆质谱分析仪及其工作原理

Quadrupole Mass Spectrometer & Working Principle

工作原理 / Working Principle



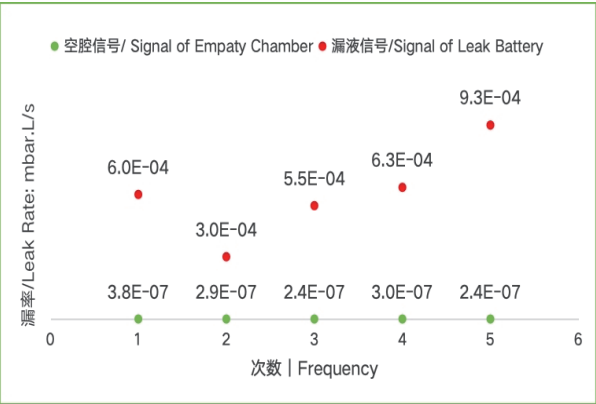
借助密封的腔体为待测电池提供一个密闭的检测空间，通过抽负压达到真空度要求后，完成对漏液电池的泄漏侦测。

With the help of the sealed chamber, the battery to be tested is provided with a detection space without interference from the external environment, and the leak detection is completed after the negative pressure reaches the vacuum requirement.

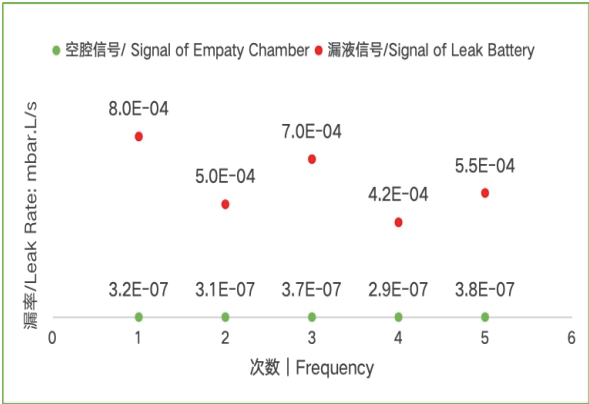
在腔体真空抽到-101Kpa（相对真空值）后，腔体通往仪器采样系统的阀门打开，腔体内的电解液分子将被吸往四级杆电场进行电离和质量分析，最终输出漏率和OK&NG判定。关键工艺参数与产品码绑定后可对接MES上传。

After the chamber vacuum is pumped to -101Kpa (relative vacuum value), the valve from the chamber to the instrument's sampling system is opened, and the electrolyte molecules in the chamber are sucked into the electrical field consist of quadruple rods and be ionized and analyzed, the instrument will output the leakage rate and OK/NG judgment. The key process parameters can be connected to the MES and uploaded after being bound to the product code.

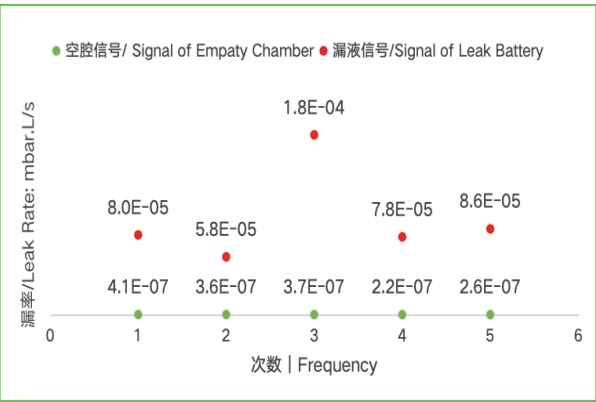
测试案例 / Case



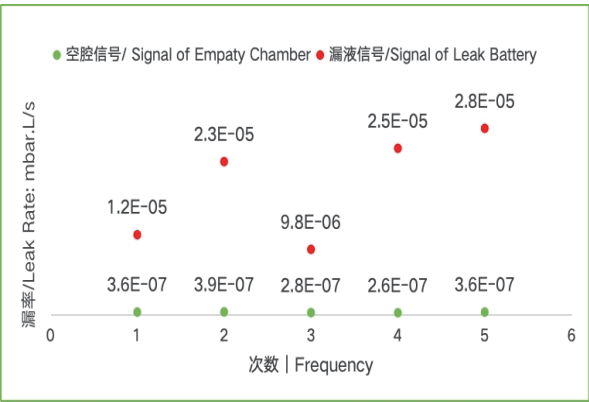
检测动力电池的漏液的信号 / Leaking Signal of EV Battery



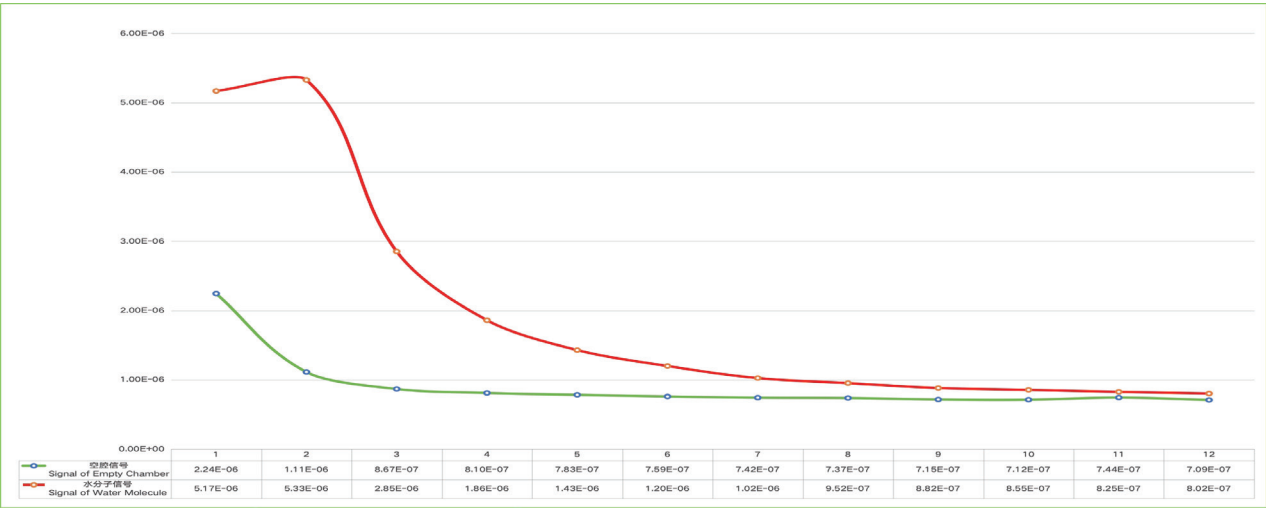
储能电池漏液信号 | Leak Signal of ES Battery



圆柱电池漏液信号 | Leak Signal of Cylindrical Battery



软包电池漏液信号 | Leak Signal of Pouch Battery



电池水含量信号 | Signal of Water Molecule

锂电池漏液VOCs检测仪及其工作原理

VOCs Detecor for Battery Leak & Working Principle



VTK-181



VTK-501 Pro

产品特点 / Product Features

- 1ppb级高分辨率
High resolution with 1ppb
- 检测响应速度快
Fast response
- 应用于低浓度VOC检测
Applied for low cocentration VOC detection
- 支持24小时连续在线检测
Support 24-hour online detection

适用于软包电池漏液检测

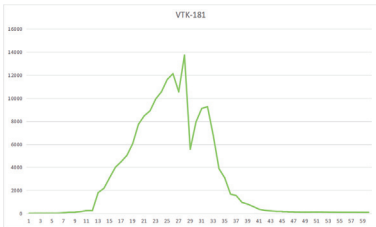
Suitable for leak detection of pouch battery

产品参数 / Specifications

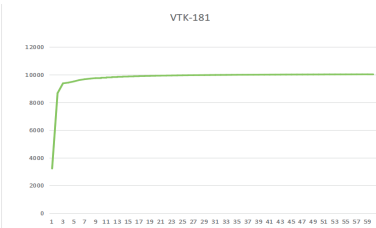
传感器/Sensor	10.6eV光离子化传感器/10.6 eV PID
检测量程/Detection Range	0-50000ppb
检测分辨率/Resolution	1ppb
响应时间/Respond Time	2 Second
检测准确性/Accuracy	±3%
采样方式/Sampling Way	泵吸式自动进样/Built-in Pump
防护等级/IP Rating	IP66/IP67
工作温度/Temperature	-20°C~50°C
工作湿度/Humidity	0~95%RH (无冷凝)
尺寸/Size	230mm x 80mm x 60mm
重量/Weight	680g
泵流量/Pumping Flow	250-450ml/min
警示方式/Alarms	90dB@30cm、LED闪烁
质保/Warranty	整机质保1年 / 1 year

测试案例 / Case

VTK-181

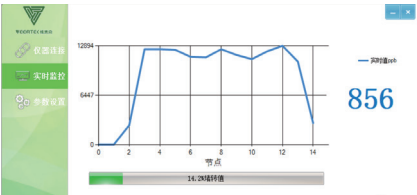


某漏液电池样品的VOC值
VOC Volume of A Leaking Sample

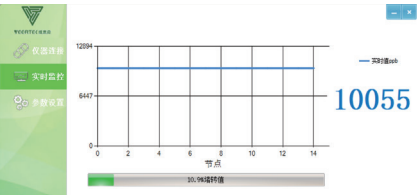


回读10ppm标准气体异丁烯的VOC值
VOC Volume When Reading 10000ppb Isobutylene

VTK-501 Pro



某漏液电池样品的VOC值
VOC Volume of A Leaking Sample

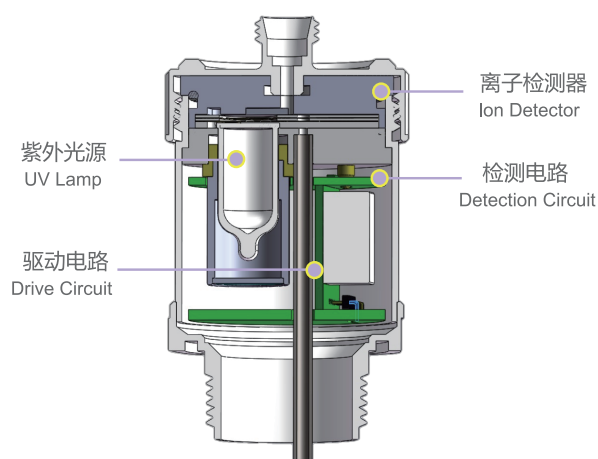


回读10ppm标准气体异丁烯的VOC值表现
VOC Volume When Reading 10000ppb Isobutylene

锂电池漏液VOCs检测仪及其工作原理

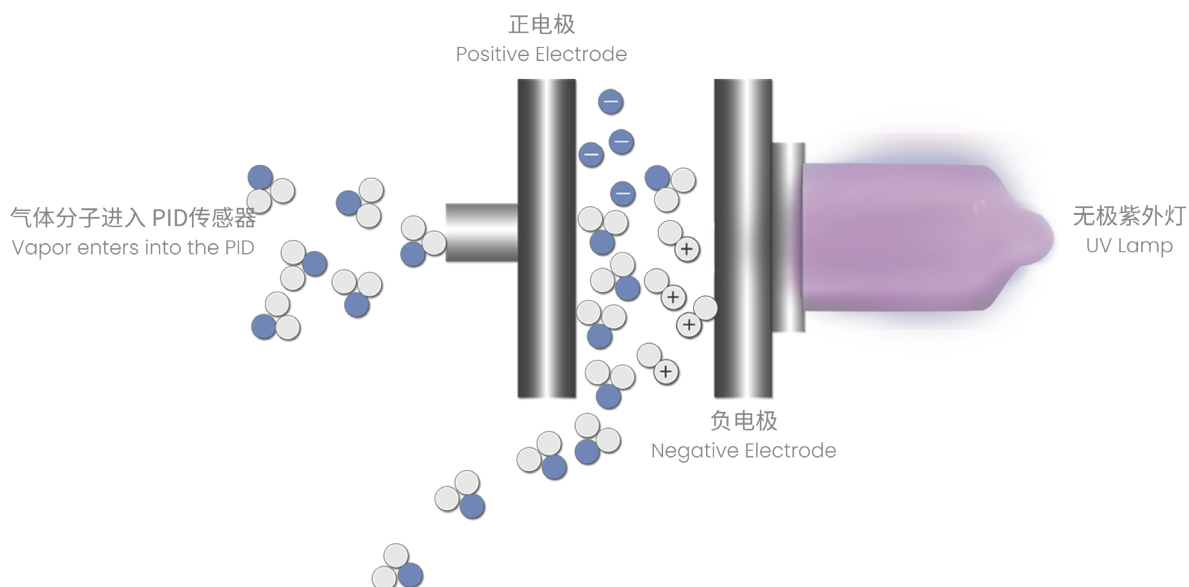
VOCs Detector for Battery Leak & Working Principle

工作原理 / Working Principle



PID传感器由电离室、UV无极紫外灯、检测器和正负电极构成。

The sensor consists of an ionization chamber for letting in the detectable gas, an ultraviolet lamp for applying light, a detector for utilizing the light fully and positive and negative electrodes for detecting ion currents.

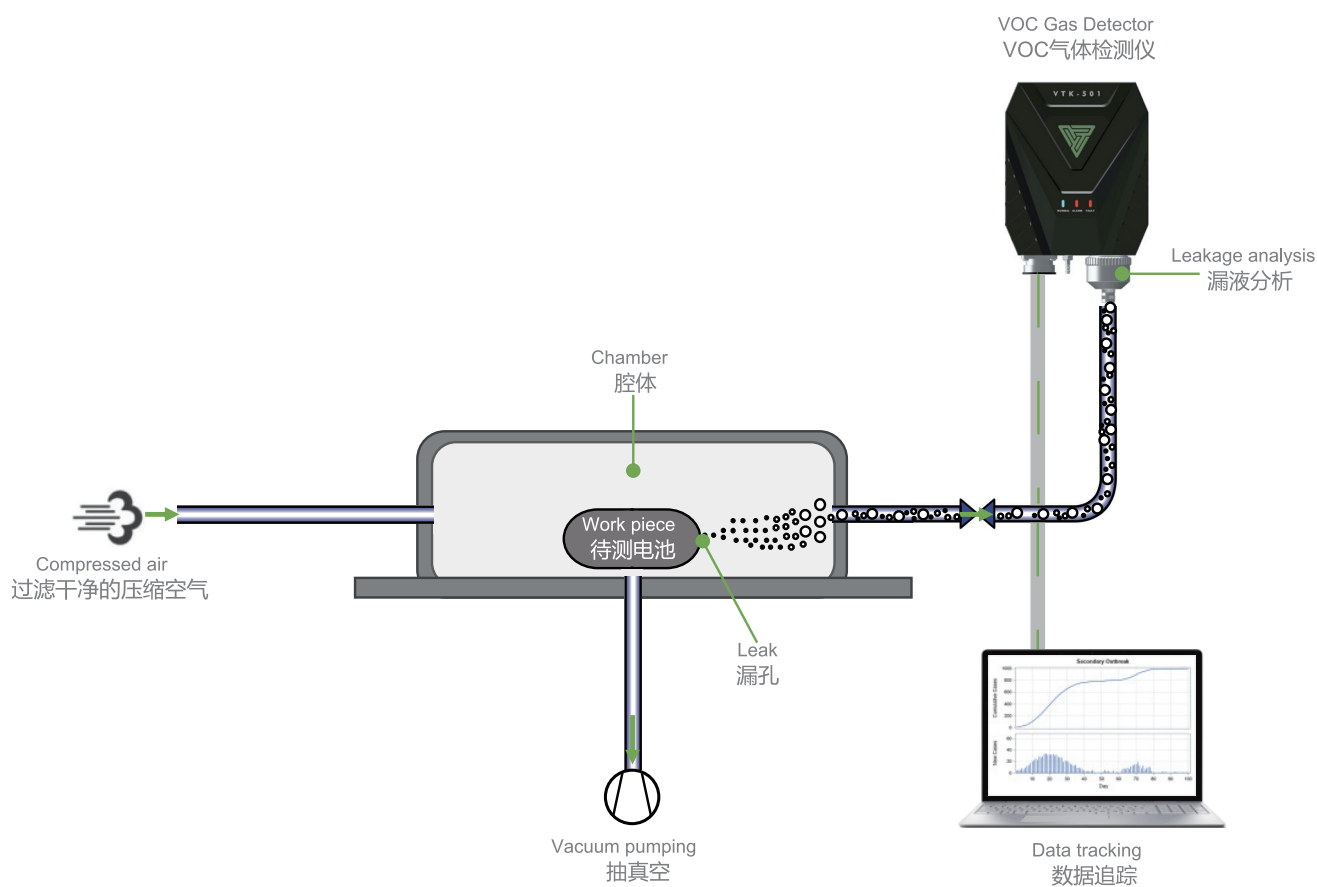


气体分子进入电离室后会遇到UV无极紫外灯发出的高能量的紫外光。在光子的作用下，气体分子被电离成负电子和正离子。

The detectable gas enters the ionization chamber and is exposed to ultraviolet light from the light source (ultraviolet lamp). This causes the gas to release electrons, generating cations.

PID传感器利用紫外光电离有机气体分子，在电离过程中会产生极其微弱的离子流，离子流被收集后，经滤波、多级放大运算后转化成与浓度有关的模拟信号输出，呈现出在测气体的浓度值。

The PID applies ultraviolet light to the detectable gas to ionize it. This causes an ion current to be generated. The sensor measures this current to determine the gas concentration.



借助密封的腔体，为待测电池提供一个不受外部环境干扰的检测空间，并通过抽负压——保压——充正压的方式完成对漏液电池的检测，将不良品电池拦截在产线上。

With the help of the sealed chamber, the battery to be tested is provided with a detection space that is not interfered by the external environment, and the leakage battery detection could be completed by vacuum pumping -- maintaining negative pressure -- charging positive pressure on the integrated VOC testing machine, thus, the defective battery could be intercepted on the production line effectively.

绝缘脉冲测试仪及其工作原理

Insulation Impulse Tester & Working Principle



适用于注液前锂电池微短路检测
Suitable for short circuit detection

产品特点 / Product Features

- 检测精度高
High Precision
- 对电池零损伤
Little Damage to the cell
- 检测效率高
High Efficiency
- 兼具脉冲和阻抗检测两种功能
Both Impulse & Impedance Detection Functions

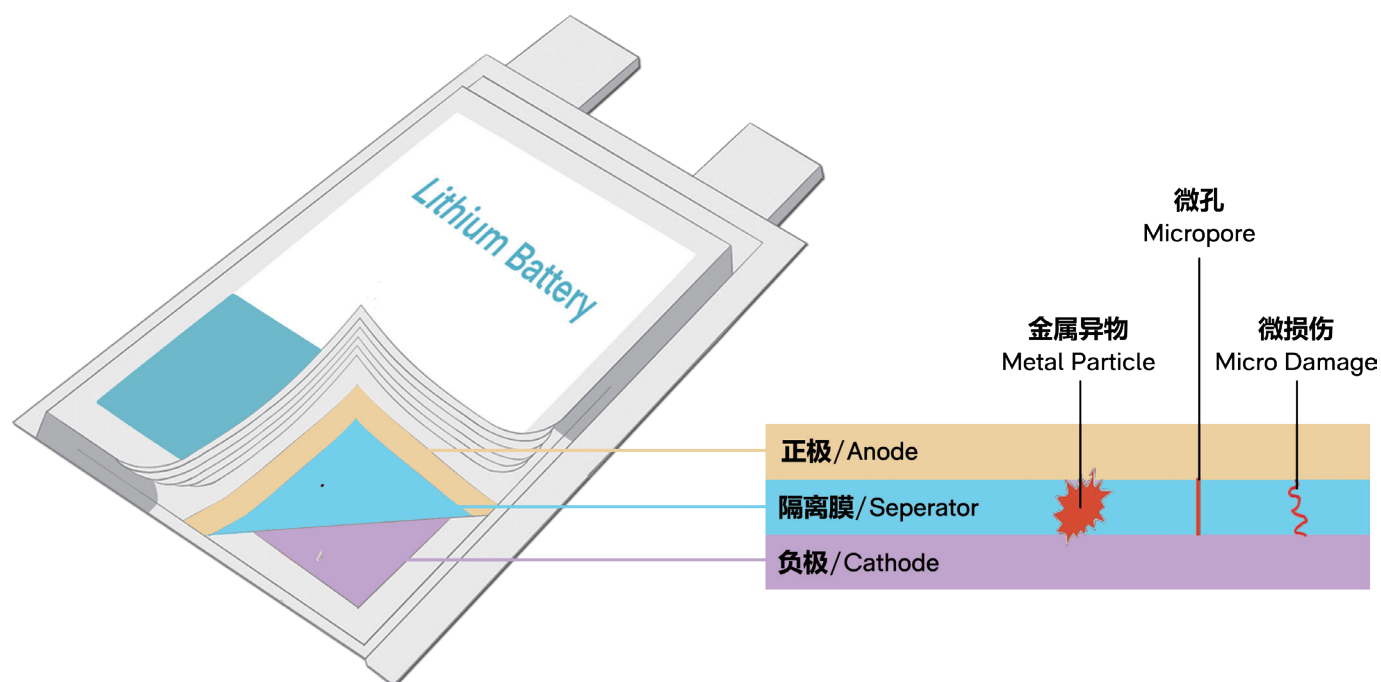
检测工位 / Testing Stations

- 卷绕/叠片后
After Winding/Laminating
- 热压后
After Hot Pressing
- 极耳与盖板超声焊后
After ultrasonic welding of the pole lug and cover plate
- 盖板与铝壳激光封口后
After laser sealing between cover plate & aluminum shell
- 电池烘干后（注液前）
After baking (before injection)

产品型号 / Model

Item \ Model	DET-1090	DET-5000	DET-8500	DET-1015K
测试电压 Voltage	50-2000V	200-2000V	50-800V	50-800V
测试时间 Testing Time Span	10-3000mSec	10-3000mSec	10-3000mSec	10-3000mSec
静电容量 Electrostatic Capacity	10-90 nF	10-5000 nF	3500-9000 nF	10-15000 nF

脉冲检测工作原理 / Working Principle



基于电荷守恒定律【 $Q=CU$ ，其中 Q =电荷量(库伦), C =电容(法拉), U =电压(伏)】的机理和电量充电保护的原则，绝缘脉冲测试仪将为被测电池提供特有的脉冲电压，当电压施加到电池上时，正负电荷就会迅速分布在正负极片表面。如果夹在正负极片中间的隔离膜存在缺陷，分布在正负极片上的电荷便会迅速移动，从隔离膜缺陷处流失大量电荷，此时便会产生电压跌落（即电压降），从而实现对隔离膜存在缺陷的NG电芯进行识别和拦截。

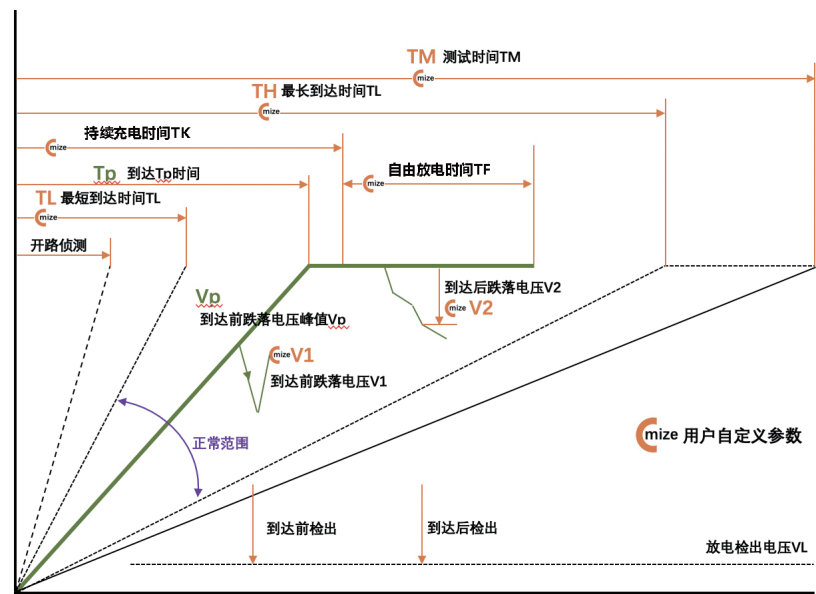
Based on the law of conservation of charge 【($Q=CU$, Q =Quantity of Electric Charge (Coulomb), C =Capacitance (Farad), U =Voltage (Volts) 】 and the principle of battery charging protection, the tester will provide a specific impulse voltage to the battery. When the voltage is applied to the battery, positive and negative charges are rapidly distributed on the surface of the positive and negative electrode plates. If there is a pore on the separator, the charges will move and be lost rapidly on the site of pore, then the voltage drop will be generated which can help users to identify and intercept the NG cell with defects on the separator.

绝缘脉冲测试仪及其工作原理

Insulation Impulse Tester & Working Principle

脉冲检测报错参数/Error Parameters

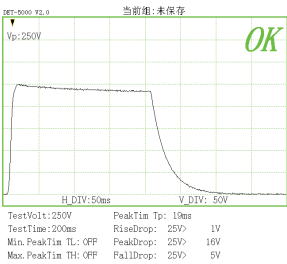
代码/Code	含义/Meanings
OC E01	开路/Open
SC E02	短路/Short
UV E03	欠压/Undervoltage
OV E04	过压/Overvoltage
NG E05	V1超限/V1 Drop
NG E06	V2超限/V2 Drop
NG E07	$T_p < T_L$
NG E08	$T_p > T_H$
NG E09	V3超限/V3 Drop



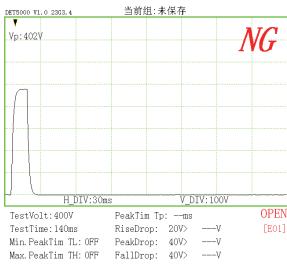
脉冲检测功能参数 / Specifications

输出电压/Output Voltage	范围/Range: (50~ 1000) VDC
三通道选择/Options of Channels	H_L_X、H_X_L、L_H_X、L_X_H、X_H_L、X_L_H
检测量程/Detection Range	10 ~ 5000nF/3500 ~ 9000nF/10 ~ 15000nF
持续充电时间TK/ Charging Keeping Time	20ms ~ 3000ms
自由放电时间TF/Free Discharging Time	20ms ~ 2980ms
充放电模式/Charge-Discharge Mode	恒流充电最大/Charging Max:50mA、恒流放电/Discharging18mA
判断参数/Judgment Parameters	T_p , V_p , V_d
供电电源/Power Supply	AC220V±10%, 50Hz/60Hz
额定功率/Rated Power	200VA
输入接口/Input Interface	RS232C, LAN(选配/Optional) , PLC, USB (存储/Memory)
重量 (净重) / Weight(Net Weight)	5kg
体积 (mm) / Volume(mm)	213 (W) *88 (H) *360 (D)

脉冲检测报错图型 / Error Graph



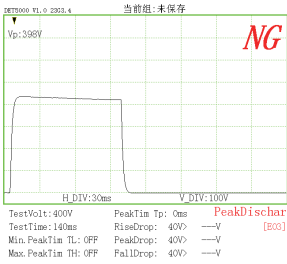
良品电池波形
OK Cell



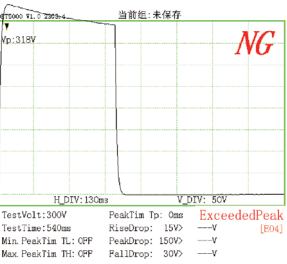
【E01】开路: 因测试夹与极耳接触不良, 未形成回路继而放电。
【E01】 OPEN: Poor contact between test clips & pole ears lead to OPEN.



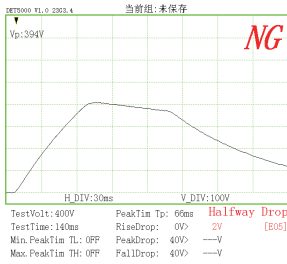
【E02】短路: 隔离膜破损或电芯内部有金属异物导致的短路。
【E02】 SHORT: caused by damaged isolation film or metal particles inside the battery cell.



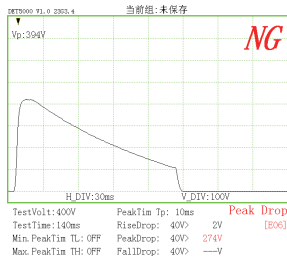
【E03】欠压: 充电未达设定电压的95%。
【E03】 UNDERVOLTAGE: Charging has not reached 95% of the set voltage.



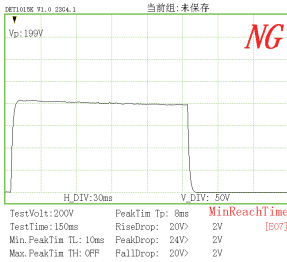
【E04】过压: 充电电压超出设定电压的20%。
【E04】 OVERVOLTAGE: Charging voltage exceeds 20% of the set voltage.



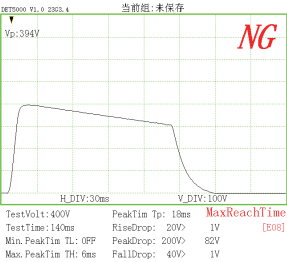
【E05】V1 超限: 充电阶段的微短路导致电压跌落超过设定值。
【E05】 V1 DROP: Short circuit during charging phase causes voltage drop exceeding the set value.



【E06】V2 超限: 自由放电阶段的电压跌落值超过设定值。
【E02】 V2 DROP: The voltage drop during the free discharge phase exceeds the set value.



【E07】TP<TL: 充电速度低于TL设置下限。
【E07】 TP<TL: The charging speed is lower than the TL set.

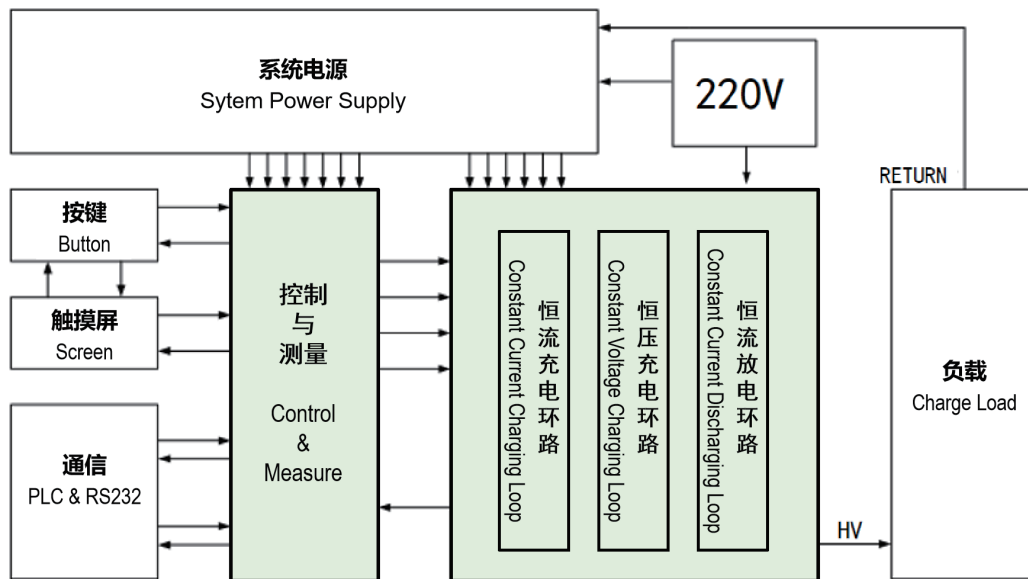


【E08】TP>TH: 充电速度高于TH设置上限。
【E08】 TP>TH: The charging speed is higher than the TH set.

绝缘脉冲测试仪及其工作原理

Insulation Impulse Tester & Working Principle

阻抗检测工作原理 / Specifications



阻抗检测功能则基于欧姆定律，即 $V=IR$ ，其中 V 为电压， I 为电流， R 为电阻值。

具体工作原理为：电阻测试仪通常通过产生一个已知电流或电压的电信号，并将其通过待测电阻。

仪器通过测量通过待测电阻的电流或电压，可以计算出电阻的数值。根据欧姆定律，电阻值等于电压与电流之比，即 $R=V/I$ 。

The impedance detection function is based on Ohm's law. Namely, $V=IR$, where V stands for Voltage, I stands for Current, and R stands for Resistance Value.

It's working principle is: A resistance tester typically generates an electrical signal of a known current or voltage and passes it through the resistance being tested.

By measuring the current or voltage passing through the tested resistor, the value of the resistor can be calculated. According to Ohm's Law, the resistance value is equal to the ratio of voltage to current, that is, $R=V/I$.

阻抗功能参数 / Specifications

输出电压/Output Voltage	范围/Range: (25~1000)V
电阻上限/Resistance Upper Limit	(0.002~100000) MΩ, 0=无上限)
电阻下限/Resistance Lower Limit	(0.002~100000) MΩ
判定时间/Testing Time	(0.5~999.9)s, 0=连续测试
缓升时间/Charging Time	(0.1~999.9)s, 0=关闭
缓降时间/Decharging Time	(1.0~999.9)s, 0=关闭
三通道选择/Options of Channels	H_L_X、H_X_L、L_H_X、L_X_H、X_H_L、X_L_H

判定案例 / Cases of Judgement



NG判定： 短路

NG: Short-circuit



NG判定： 测试值低于设定下限值。

NG: The test result is lower than the set lower limit value.



NG判定： 测试值高于设定上限值。

NG: The test result is higher than the set higher limit value.



NG判定： 开路。表笔没有接触到负载。

NG: Open, The test probes are not in contact with the load.

我们的客户 | Our Clients



我们提供专业的锂电池安全检测方案

基于对锂电池生产工艺的了解和对电池制程中安全管控的深入研究，VEERTEK致力于为客户提供前沿的电池安全检测方案和专业可靠的服务。

我们是一家懂电池的仪器公司

VEERTEK团队中既有Hi-pot检测技术、PID光离子化技术和质谱技术领域的专家，也有多名来自锂电池行业的专家。基于对锂电池的深入理解，我们能帮助客户提供更有效的解决方案。

我们可提供定制化服务

针对锂电池客户，VEERTEK可根据客户的特定需求，提供一对一服务，开发更具针对性的检测方案；针对集成商客户，VEERTEK可提供成熟的模块化检测方案，方便客户集成。

We provide professional battery safety detection solutions

VEERTEK is committed to providing customers with cutting-edge battery security detection solutions & professional and reliable services based on our understanding of lithium battery production process & comprehensive study on safety control during the battery manufacturing process.

We are an instrument company that understands lithium battery

Besides Hi-pot technology experts, PID experts and Mass Spectrometry experts, VEERTEK have experts from the lithium battery industry as well. Based on our deep understanding of lithium battery, we can provide more professional detection solutions.

We can provide tailored solutions

For lithium battery customers, VEERTEK can provide one-to-one service based on customer's specific needs and develop more targeted testing solutions; For integrator customers, VEERTEK offers mature modular detection solutions for easy assembling.



扫码访问维泰克官网



关注官方微信公众号

地址/ADD: 深圳市龙岗区龙岗大道中粮祥云广场2栋A座816室
Room 816, Tower A, Zhongliang Xiangyun Plaza, Longgang District, Shenzhen, China
电话/TEL: 0755-2828 3466
官网/Wbsite: www.veertek.com
电邮/Email: venus.lee@veertek.com