T Rod

电极棒水处理系统

安装、操作和维护手册

上海兔置节能科技有限公司

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惯用符号：请留意下面的惯用符号以便能更容易了解本文件。请特别注意警语、小心注意事项和附加的指示说明。如果疏忽未留心，有可能造成伤害或伤亡，T Rod 电极棒水处理系统也可能因而故障，使得您的保修失效，或您的系统无法获致最佳的结果。

本文件的标准内文是以宋体字型印刷。请注意，以下所作注释的特别内文讯息是以Times New Roman 字型打印。

警告：「警告」讯息是以粗体大写斜体字型印刷，并伴随一内含闪电记号的三角形符号。不遵守警告讯息内容有可能造成人员的伤亡。请在安装或维护T Rod电极棒水处理系统之前务必详读并了解警告讯息。

小心：「小心」讯息是以粗体大写字型印刷，并伴随一内含惊叹号的三角形符号。不遵守注意讯息内容有可能导致设备，或T Rod电极棒水处理系统的损坏，或让您的系统保修失效。

注意：「注意」讯息是以斜体字印刷。并含有内一举手标记的正方形符号。该讯息在安装、操作或者保养维修您的T Rod电极棒水处理系统时，用以提醒您提高警觉的注意信息。

进一步资料：「进一步数据」讯息以Times New Roman字型印刷， 并表明其它可以让您的T Rod电极棒水处理系统得到最大受益的数据源。

恭　喜!

您现在拥有当今最好的胶体分散和物理水处理系统 T Rod。该产品适用于反渗透 RO 膜系统、微生物细菌生物膜的生物控制、冷却循环水处理系统以及不能加化学药剂的水处理系统。

T Rod电极棒水处理系统利用最新进的技术来保护您的水处理系统而不会毁损环境。透过适当的安装、操作和保养，您的T Rod 电极棒水处理系统将可提供您长年忠实的服务，并且将可延长该系统设计所要保护设备的寿命。

卸货、搬运和安装您的T Rod电极棒水处理系统之前，请务必再详阅本文件内的数据。错误的装卸、安装或保养因而造成设备损坏将让保修无效。

有限保修说明

上海兔置节能科技有限公司只授权高压电源和T Rod电极棒从产品交运日起算享有三年保修期，只要是终端用户从本公司正式授权的OEM、经销商、贩卖商或销售代表处所购买的产品，并获得本司事前的同意，且预付运费将该产品送回本公司，同时附上批准号码及进一步提出该产品并未曾误用、不适当操作或曾遭未经核可的修理或改装，或是取得本公司认可的代表人副署，兔置公司将以该公司所鉴定材料 或制作的瑕疵为准进行更换、修理或提供信用保证。

本项保修声明取代了其它保证书、陈述、暗示或法令，包括市场性的保证、合用性 或特殊用途适用性的保证、或其它所有将课以公司的责任兔置或义务；同时兔置公司既不承担，也不同意任何人去让兔置公司承担任何有关前述销售产品其它的义务。

如果兔置公司对宣称有瑕疵而求偿的该产品检查后并没有发现材料或制作上瑕疵时，终端使用者同意支付兔置公司就包装拆卸、测试、重新包装该产品，并再运回终端使用者因而所发生的费用。

本项条款声明终端使用者违反保证规定所应负责全部的且唯一的补偿。

本项条款声明并未延长任何经过兔置公司修理或更换的电极产品其原有的保修期限。

上海兔置节能科技有限公司

2016年6月16日

本手册提供您应该遵循的相关程序，以便让您的投资能获得最大受益。本手册阐明您的电极水处理系统所有组件的安装、操作和保养，包括：

1. T Rod电极棒本体，
2. 高压电源和配电箱，
3. 高电压电缆，防水穿线管，防水波纹管和线路配件和各种接头。

本文件同时说明故障排除的步骤，让您能用以鉴定潜在问题的原因，以及如何去改正它们。

注意：请在拆箱、搬运并安装您的T Rod电极棒水处理设备系统之前，务必从头到尾的详读本手册。现在花费一些时间让您本身熟悉搬运、安装和操作程序，将可帮助您防止稍后可能造成性能不足、系统故障、危害人员以及本系统保修失效等等问题的发生。

进一步资料：如果您有对T Rod电极棒水处理系统相关的问题，或您对本手册有改进建议，请依下列方式与兔置公司联络：

上海兔置节能科技有限公司

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T Rod电极棒水处理系统的安全性

T Rod 电极棒水处理系统将水中的悬浮粒子暴露在很高电压高达 34,000-40,000 伏特静电电压下。乍看之下好像是一个很危险的电压，然而电源通电的系统并不能输出足以致命的电流，因此人员接触到 T Rod 电极棒或 T Rod 电极棒浸没的液体并不会有触电的危险。然而，高压电源输入的交流电源就致命。

警告：连接到您用电设施的电源会有致命的电流在其内部。电源内部有设计用于防止触电危险的包覆物加以保护。当您的系统在作业中，或是当电源连接到一电源插座时，请勿打开电源内部包覆物。

虽然我们建议您在不使用您的 T Rod 电极棒水处理系统时将电力关掉，然而在系统无水情形下操作并不会损坏电极或高压电源。即便是没有水在系统中流动，本设备仍会持续对水系统产生有益的效应。T Rod 电极棒附近不流动的水将会继续受到处理。

本项装置符合*FCC*规定第*15*节内容。操作受到以下条件的限制：*(1)*本装置不会引起有害的干扰， *(2)*此装置必须接受任何接收到的干扰，包括有可能造成非预期的操作。

FCC 公告**(USA)**

注：本设备已经依据 FCC 规定第 15 节内容测试，为符合等级 A 数字装置。当设备在商业环境下操作时，这些限制的设计是用于提供合理的保护，以对抗有害的干扰。本设备会产生、使用、并散发出调频；同时，如果不是依照使用说明书安装和使用，将会对无线电通讯造成干扰。本设备于住宅区操作时，很有可能引起有害的干扰；如果遇到此种情形，使用者必须自费改正该干扰。

警告：未经负责承诺单位明确核准的变更或修改本单元装置，使用者操作该设备的权力有可能丧失。

第一章　T Rod 电极棒水处理系统工作原理

将 T Rod 电极棒安装在金属管路或水泥或者金属槽体内，高压电源给 T Rod 电极棒持续提供 34,000—40,000 伏特直流电压，这样 T Rod 电极棒棒体和管壁或槽体周围形成一个电场。在电场的作用下，流经电场的胶体粒子能瞬间提升粒子电位。提高水中粒子与粒子间的互斥力。

因此，无论是无机物结垢粒子、微生物等胶体粒子，都可以让其表面包覆相同电性，彼此相互排斥，呈稳定的分散状态，从而有效延缓沉积或结垢。

第二章　设备组成　高压电源及配电箱

高压电源是一个集成的高压电源模块，里面有 220 伏特交流电源转换 0-40,000 伏特直流电压及控制电路和保护电路等。客户只需将 220 伏特交流电引入到配电箱即可。

图 2-1 高压电源

1　电压显示屏幕　2 启动按钮　3 复位按钮　4 接地螺丝

5 高压输出接头

高压电源提供 T Rod 电极棒直流电，其规格如表 2-1 所示。

表 2-1　高压电源规格

型号	TR 36
电源输入电压	90V-240VAC
电源功率	最高 35W
输出电压范围	0~40kVDC
工作电流	0.03-0.08 mA
最大工作电流	1mA
纹波 (最大)	0.025% Vp-p
使用环境温度	使用温度 -40℃ to +65℃ 存储温度−55℃~+105℃

高压电源能输出工业标准 4-20mA 信号，提供状态显示和电压显示，客户可接入工厂的 DCS 系统中，该 4-20mA 的输出值与供应到 T Rod 电极棒的实际电压伏特值成比例：4mA 代表输出电压值接近 0 伏特，而 20mA 则指出输出的电压值接近 34,000-40,000 伏特。

高压电源有过电流保护设置、过电压保护电路设置、拉弧侦测保护电路设置。如侦测到输出电流超过 1mA，则自动切断电源。如果侦测到供应电力到 T Rod 电极棒的电路中有电弧，电路保护设置也会让电源供应立即停止操作。

高压电源电气绝缘图2-2所示：

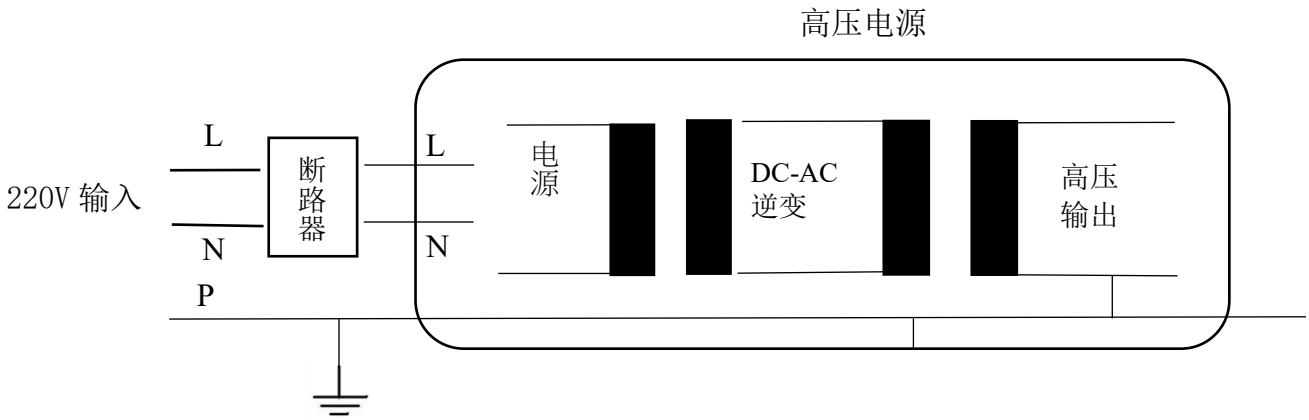

图2-2 电气绝缘图

安装的高压电源应越接近它所要供电的 T Rod 电极棒越好，如此就不会安装电源有电线线路损失来影响操作。除此之外，高压电源的配电箱必须放置在适当位置，以便巡检人员能方便的查看工作状态。

高压电源外壳的物理方位对操作没有影响，然而为了能获得实质清晰可见状态指示灯号，仍建议该高压电源应如上述方式定位，以免造成未经许可的损坏，或可能的触电。

配电箱尺寸为 520mm×450mm×120mm，配电箱内集成了高压电源，空气开关以及接地线。典型配电箱如图 2-2 所示。

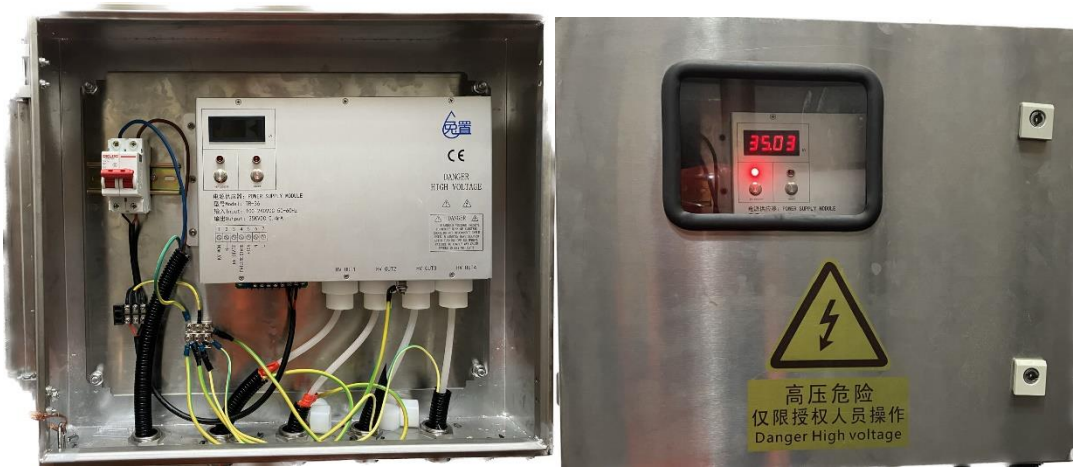

图 2-3 配电箱

小心：为了确保系统能适当的操作，所有的高压电源和电极安装位置已经适当地接地到一良好、可靠的电气接地点，同时必须在电源装置已连接到交流电源，且无压降、涌浪、或突波脉冲的情形下，才能操作设备。

注意：电源的设计是在工业环境下操作。然而，如果高压电源重复的受到极度的涌浪、压降或突波脉冲，仍有可能发生故障。由于不当的电力输入所造成高压电源的损坏将不适用您的 T Rod 电极棒水处理系统保修条款。

第三章　电气安全规范说明

在正常操作条件下，T Rod 系统将水中的悬浮粒子暴露在 34,000-40,000 伏特电压形成的电场内。人的潜意识感觉上好像是一个很危险的电压，然而通电的 T Rod 系统是高电压低电流系统。在正常的操作下，该系统像一个电容充电器一样，由高压电源转换 34,000-40,000 伏特高电压，四支 T Rod 电极棒全部负载输出实际在 0.03-0.08mA, 最高输出电流即断路电流为 1mA。现场实际以电流表量测甚至都测不出输出电流。因此并存在没有安全性的致命电流。即使人员直接接触 T Rod 电极棒或电极棒浸没的液体并不会有触电的危险。若系统因不正常操作或其他外力等因素导致系统故障，高压电源会立即切断电压输出，并同时提供信号让高压电源外壳上的复位按钮灯亮起。再者，高压电源内有电弧侦测电路设计，如果侦测到供应电力到 T Rod 电极棒的电路中有电弧或者系统短路等故障问题，电弧侦测电路亦会让高压电源供应立即停止操作。因此，若系统发生意外故障时，高压电源会因为故障形成的电压压降或是电弧现象，高压电源会立即停止输出，并亮起外壳上的复位按键灯。如果电路系统或者电极棒漏电超过 1mA，电源也会立即切断并且红色复位健按钮亮起。而在故障端部分，原本在系统内的余电亦会慢慢下降消失，或因故障端直接接地将系统余电导出；倘若故障端直接、间接漏电与人体接触，其电流应属于下表中可脱逃电流感电影响，再者，由于系统故障时，高压电已同时立即停止供电。因此，在整个电路系统不会持续放电造成二次触电危险。

表 3-1 不同电流对人体的影响

感电影响	电流(mA)					
	直流		60Hz 交流		10000Hz 交流	
	男	女	男	女	男	女
感知电流：开始有刺激	5.2	3.5	1.1	0.7	12	8
可脱逃电流：肌肉尚可自由活动	62	41	9	6	55	37
不可脱逃电流：肌肉无法自由活动	74	50	16	10.5	75	50
休克电流：肌肉收缩、呼吸困难	90	60	23	15	75	50
心脏麻痹电流：心室痉挛、呼吸停止	500	500	100	100	500	500

数据源：内藤胜次著，赖耿阳译，1991，《电气安全教材实务》，复汉出版社。

第四章　设备组成　T Rod 电极棒

图 4-1 T Rod 电极棒图片

T Rod 电极棒体是由一个白色陶瓷管子所构成，陶瓷管材质为氧化铝陶瓷。 一端为封闭的圆形，另一端能配合 316 不锈钢螺纹管件。T Rod 电极棒陶瓷标准长度为 36 英寸即 920 毫米。连同不锈钢螺纹接头及外 PVC 接头长度约为 1100 毫米。T Rod 电极棒直径为 1.25 英寸即 31.8 毫米。本公司生产的 T Rod 电极棒只有一个型号，即 TR100 型号。

所有部件均符合食品级应用。

T Rod 电极棒体是由耐高压、防水、且可耐包括强酸和强碱在内的大部分化学药品的陶瓷材料所构成。然而，该管子并非防碎的，受到工具的轻轻一碰、或操作用力过当、掉到地上、或用 T Rod 电极棒敲击硬物或表面，有可能管子就碎掉或破裂。其最大承受压力为 500PSI(3477Kpa)，我们建议您将电极棒在它原有的包装内，除非您准备要安装它们。

T Rod 电极棒配件有 1.5 英寸 NPT316 材质外螺纹。对于要安装的 T Rod 电极棒，应安装适当的配件，以接受标准的 1.5 英寸 NPT 公头配件。

T Rod 安装在反渗透 RO 进水前的水槽内或者水池内，例如超滤产水池，浓水箱等。如果用在冷却循环水系统内，则安装在冷却水池内。现场安装方式及安装位置由兔置公司的专业技术人员现场与客户确定。

警告：为了去除触电可能性的不安，请随时关闭系统的电源，并在要在设备上面工作时，预留一分钟让电极的充电消失。

注意：请注意，所有的T Rod电极棒管件有1.5英寸的NPT公螺牙。因此不管您是安装什么大小的T Rod电极棒，您应该安装能够衔接标准1.5英寸NPT公牙管件适当的管件和金属器件。

小心：T Rod电极棒交运前已在原厂做过彻底的测试。如果在拆箱、安装过程中，或是在保养所要保护的设备过程中，未能小心的操作，T Rod电极棒有可能受到损坏，而此等损坏并不适用保修条款。同时，此等损坏有可能看不见且有可能在安装后电极无法正常操作时才出现。因此，兔置公司建议您将T Rod电极棒放在它原先的包装内，直到要安装它们的时候才拿出来。

启动注意事项

虽然T Rod电极棒相当坚固耐用，它仍有可能受到水锤或其它物体敲击下所产生巨大的剪力而损坏或破裂。因此，请避免让T Rod电极棒受到水锤或让液体系统中其它松掉的物体敲击到T Rod电极棒。

注意：您的T Rod电极棒水处理设备系统条款将不适用于受到水锤或让液体系统中其它松掉的物体敲击到T Rod电极棒所引起的触电或震动因而造成的损坏。

第五章　设备及电气安装和调试

T Rod 电极棒及电源配电箱的现场安装位置和安装方式由现场决定，兔置公司会根据现场提供施工图纸或者安装示意图。业主负责安排合格施工商提供必要的工程施工，例如管道开孔，焊接，水池安装支撑，或者按照图纸电缆线铺设等。本公司专业人员现场负责 T Rod 电极棒的安装和 T Rod 电极棒电缆和配电箱的接线以及调试工作。

安装过程中确保配电箱正确接地，确保高压电缆屏蔽线正确接地。

第六章　故障排除

您可以利用本章节所说明的步骤判断您的T Rod电极棒水处理系统问题的故障排除性并找出问题发生的位置。

系统发生问题时，请利用下面的步骤处理该问题：

1. 请温习本章节内容有关解决问题的信息。

2. 请确定电源已正确的连接到一个可靠的交流电力供应设施并保证配电箱已经适当的接地。请检查确认是否所有的配线接头均牢固且正确，以及所有的断路器/保险丝是否都安装在正确位置。检查T Rod电极棒上绝缘器是否安置在适当的位置，并且电线帽盖是否有填注绝缘润滑脂。

警告：触摸或工作于电线或接头、打开高压电源外壳、或旋松电线帽盖之前，请务必确保该系统已切断交流输入电力供应的连接。

3. 请详读下面的故障排除章节以便找出问题发生的症结，并且依照所指示的步骤排除问题。

4. 如果该单元装置仍无法正常操作，或是您仍有疑问，请依照本章最后所列的联络方法与兔置公司联系。

通常来说，电缆线故障是导致T Rod电极棒水处理系统故障的多数原因。

通常所使用的绝缘方式，像是利用电工的电线塑料胶带或金属导管均无法有效的控制高电压。高电压有可能引起弹出高达6英寸（152毫米）的电晕放电(像闪电般的火花)，并且会烧穿不当绝缘的材料。因此，限使用非金属导管以及与系统一起供应的高电压额定电缆，以防止电晕放电。

警告：您的保固条款有可能因使用非兔置公司提供的组件、连接器、电线以及绝缘润滑脂进行替换并使用而失效。限使用与您系统一并提供的本公司所组件和材料来安装电极棒、接线、和高压电源。因不正确的安装所引起电晕放电，进而造成系统的损坏，将不适用本公司保修条款。如果您需要额外的材料或建议以便完成您的系统安装，请与兔置公司相关人员联络。

高压电源装置有启动开关LED指示灯和复位RESET开关LED指示灯和电压显示屏，LED指示灯均为红色,电压显示屏显示也为红色，只要有适当的交流电力供应到该单元设备，按下开关按钮，面对着高压电源方向左边的开关LED指示灯就会亮起，电压显示屏的电压显示值为34 -40KV。

如果电压显示值为 0 KV，和右边的复位RESET开关 LED指示灯亮起来表示有系统故障发生，例如高压电源故障，高电压输出，或电极接线发生短路，无法输送高电压。

复位RESET开关 LED指示灯亮，按下复位RESET开关，如果电源能够启动并且运行正常。则表示某一位置发生了轻微的放电现象，整体电路及设备没有损坏。继续使用电源。

如果按下复位RESET后电源仍然不能正常工作，并且电压达不到最低34KV，复位RESET开关LED指示灯有故障的指示灯仍然亮起，电压显示屏显示电压为 0 KV。请依照下面的故障排除方法进行处理。

警告：为了防止触电的危险，在触摸任何接线之前，请务必从电源端关闭电源，并让系统放电大约一分钟。可以用一条绝缘电线来让T Rod电极棒和所有的电缆线接头放电，只要将其一端瞬间接触接地而另外一端接到T Rod电极棒或电源接头即可。

进行任何故障排除步骤之前，请确认您的T Rod电极棒系统正确地连接到有源电源的交流电力，以及配电箱进行了正确的接地。

如果输入交流电力有在通电中，且电源开关是在按下启动状态，正面面板上电压显示屏显示电压在升压过程中下降而不能达到最低34KV，和复位RESET开关LED指示灯亮起。请执行以下的步骤判定问题是否在电源或是在某一个T Rod电极棒或者电缆线：

图6-1 配电箱未接高压输出接头图片

1 如图6-1，先将4个高压输出接头从电源显示器上拆下来，再拧上全部四个随附的底部封闭的白色塑料螺纹接头。这样电源为空载状态。通电，按下开关按钮，开关LED灯亮起，观察电压能否达到最低34KV。如果一切正常，则高压电源无故障。

2 如果在启动过程中电压不能正常的升高到最低34KV，复位RESET开关LED灯亮起，电压回归到 0 KV，则高压电源发生故障。联系厂家更换电源。

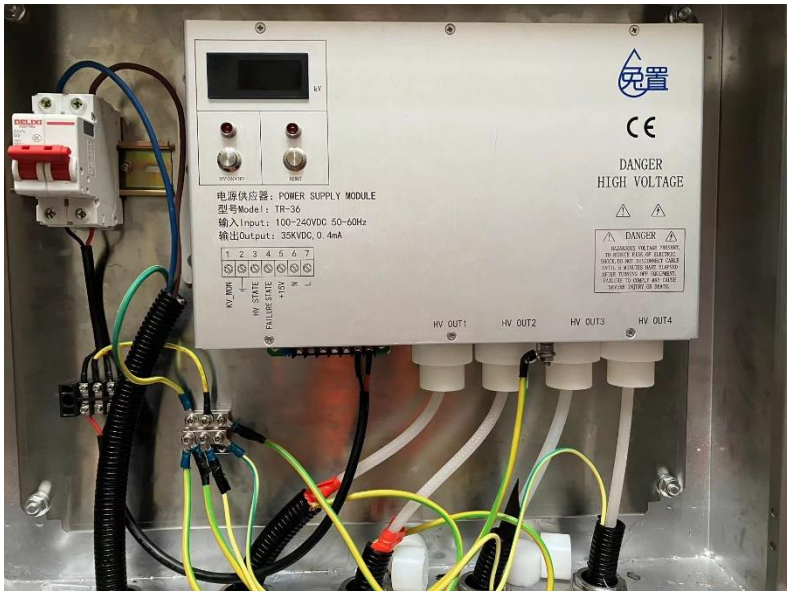

图6-2 配电箱高压输出接线图

3 如图6-2，断电后，先安装HV OUT 1电缆线接头，再接通电源，按下开关按钮，观察电压显示屏上的电压，如果电压能达到34-40 KV并且保持稳定，和复位RESET开关LED灯不亮，则此条电缆线和T Rod电极棒正常。

4 如果电压不能正常启动，例如在升压过程中电压值先上升再下降，然后复位RESET开关LED灯亮起，则表明此条电缆线或者T Rod电极棒发生故障。

5如果此线路的高压电源和T Rod电极棒之间中间有接头，断开接头重复此次检查。断开接头后，单独测试电缆线，如果高压电源正常工作，则表明此电缆工作正常，再接上接头，高压电源不能正常，则表明T Rod电极棒发生故障。联系厂家更换T Rod电极棒。

6 按照1 2 3 4步骤重复HV OUT 2、3、4电路。直到确定哪条电缆线路或者T Rod电极棒故障为止。

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T Rod ELECTRODE WATER TREATMENT SYSTEM INSTALLATION, OPERATION, and MAINTENANCE MANUAL

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info@tuzhitechnology.com

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CONVENTIONS USED IN THIS MANUAL

Please note the following conventions used to make this document easier to understand. Pay special to warnings, cautions, and pointers to additional information. Failure to heed the information provided here may result in injury or death, failure of your T Rod electrode water treatment system, voiding of your warranty, or non-optimal results from your T Rod electrode water treatment system.

Normal text in this document is printed in Arial type. Please note the following special text messages, which are printed in Times New Roman type.

WARNING：“warning” messages are printed in bold-face italic type, and are accompanied by a triangle containing a lightning bolt. Failure to comply with a warning message could result in personal injury or death. Warning messages should be read and understood before proceeding with installation or maintenance of an T Rod electrode water treatment system.

CAUTION：“Caution” messages are printed in bold-face type, and are accompanied by a triangle containing an exclamation mark. Failure to heed a caution message could result in damage to equipment or to your T Rod electrode water treatment system, or voiding of your T Rod electrode water treatment warranty.

Attention: “attention” message are printed in italic type, and are accompanied by a square containing a raised hand. Attention message are intended to alert you to important information about installation, operation, or maintenance of your T Rod electrode water treatment system.

FOR FURTHURE INFORMATION: “For further information” message are printed in Time New Roman type, and point to other sources of information that maybe useful in deriving the most benefit from your T Rod electrode water treatment system.

Congratulations !

You are now in possession of the best colloidal particle deposit control and physical water treatment system available today. This system can be used to RO membrane system to promote recovery efficiency which extend the CIP cleaning frequency, extend your unit life span and save your money.

T Rod can also be used to all the water treatment system like cooled recycled water system to provide the additional benefit which the chemicals cannot provide, such as the promotes the recycled cooled water quality so that increases the heat exchange efficiency. T Rod can control bacteria quantities and bio-film control. The best water treatment should be the chemicals + T Rod electrode water treatment system.

The T Rod electrode water treatment system using state-of-art technology to protect your water system without injuring the environment. With proper handing, installation, and maintenance, your T Rod electrode water system will provide many years of faithful service, and will probably outlast the equipment it is designed to protect.

Please review the material in this manual thoroughly before unpacking, handling, installation your T Rod electrode water treatment system. Damage to your system through improper handling, installation, or maintenance will void your warranty.

Limited Warranty

T Rod electrode water treatment system

For three (3) years with respect to power supplies and three(3) years with respect to T Rod electrodes commencing from the date of shipment. TZ company will at its sole discretion, replace, repair or furnish credit for any TZ product purchased by an End-User from a duly authorized OEM, Distributor, Dealer, or Sales Representative of TZ company that, in TZ company judgement, has a defect in material or workmanship, provided the Product is returned, transportation charges prepaid, to TZ company with TZ company's prior permission and return authorization number, and provided further that the Product has not been misused, improperly operated, or subject to unauthorized repairs or modifications, or acquired from other than an authorized representative of TZ company.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING THE WARRANTY OF MERCHANTABILITYAND THE WARRANTY OF FITNESS OR OF SUITABILITY FOR A PARTICULAR PURPOSE AND OF ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PAR OF TZ COMPANY,AND TZ COMPANY NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR TZ COMPANY ANY OTHER LIABILITIES IN CONNECTION WITH THE SALES OF SAID PRODUCT.

If TZ company examination does not disclose a defect in materials or workmanship on TZ Product claimed to be defective, the End-User agrees to pay TZ company's established charges for unpacking, testing, and repackaging the Product for reshipment to the End-User. This provision states the End-User's exclusive and sole remedy for breach of warranty. This provision does not extend the original period of any TZ Product that has been repaired or replaced by TZ COMPANY.

June 16 2016

This manual provides information about the procedures which you should follow in order to get the most benefit from your T Rod electrode water treatment equipment investment. The manual explains the installation, operation, and maintenance of all components or your T Rod electrode water treatment system, including:

1. T Rod electrodes.
2. Power supplies.
3. High voltage and service voltage wiring, fittings, and connections.

This document also explains troubleshooting procedures you can use to identify the causes of some potential problems, and how to rectify them.

Attention: Please read this manual in this entirety before unpacking, handling, and installing your T Rod electrode system. Spending a few moments now familiarizing yourself with handling, installation, and operation procedures will help avoid problems later that could result in non-optimum operation, system failure, hazards to personal, and voiding of your T Rod electrode water treatment system.

FOR FURTHER INFORMATION: Please contact TUZHI company by any of the methods below if you have questions about your T Rod electrode water treatment system, or if you have suggestions for further improvements to this document:

Shanghai Tuzhi Energy Technology Co.Ltd

Email：info@tuzhitechnology.com

Safety for T Rod electrode water treatment system

The T Rod electrode water treatment system works by exposing particles suspended in water to a very high voltage electrostatic potential of up to 34,000-40,000 DC volts. While this may seem like a dangerous voltage, the power supplies energizing the T Rod electrode water treatment system are not capable of delivering enough current to be lethal. There is no danger of electrical shock from personnel touching an T Rod electrode or coming in contact with fluids in which T Rod electrodes are immersed. However, T Rod electrode water treatment system power supplies get their input power from electrical sources than can be lethal.

Warning: T Rod electrodes power supplies that are connected to your electrical service can have lethal electrical currents inside. T Rod electrode water treatment system power supplies are protected inside enclosures that are designed to prevent danger of electrical shock. Do not open your power supply enclosures while your T Rod electrode system is in operation, or while the power supply is connected to an electrical outlet.

Although it is recommended that your power off your T Rod electrode system when it is not in use, operating your T Rod electrodes when no water is present in your system will not damage the T Rod electrodes or power supplies. And the T Rod electrode continues to have a beneficial effect on water systems even if there is no water flowing in the system. Standing water in the vicinity of a T Rod electrode will continue to receive treatment.

This devices complies with Pars of 15 of the FCC Rules. Operation is subject to he following two conditions: (1) this device may not cause harmful interference,and (2) this device must accept any interference received, including interference that may cause undesired opertation.

FCC NOTICE (USA)

NOTES: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules, There limits area designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio

communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could avoid the user's authority to operate the equipment.

Chapter 1: Introduction of T Rod electrode water treatment system

The power supply that converts 90 ~ 240 AC volts to 34,000-40,000 volts DC, and provides 34,000-40,000 DC volts potential to the T Rod electrodes. The interior coating of the T Rod electrode becomes the positively charged plate, the ceramic T Rod electrode and the particles in the water act as the dielectric, and the properly grounded pipe or vessel becomes the grounded plate of the capacitor.

Once the T Rod electrodes has been energized, it creates a high voltage electrostatic field between the two plates of the capacitor, which can boosting particle surface charge in the water so that will prevents thee particles sticking to each other.

Chapter 2: Power Supply

The high voltage power supply is an integrated high voltage power supply module, which contains a 220 AC volts power conversion 0-40,000 DC volts module and control circuit and protection circuit. Customers only need to introduce 220 AC volts wire to the distribution box.

Figure2-1 The power supply

1 Voltage display screen 2 ON/OFF button 3 Reset button
4 Ground screw 5 High voltage output connector

Caution: Do not switch on the power supply without ground terminal connected it will damage electronics. High voltage power supplies must always be grounded.

Do not touch connections unless the equipment is off and the Capacitance of both the load and power supply is discharged. Allow five minutes for discharge of internal capacitance of the power supply.

Sheet 2-1: Power Supply Specification

Model	TR 36
Input Voltage	90-240VAC
Power Output	Maximum 35W
Output Voltage Range	0~40kVDC
Output work Current	0.03-0.08 mA
Maximum work Current	1mA
Ripple (Maximum)	0.025% Vp-p
Environmental Temperature Range	Operating: -40℃ to +65℃ case temperature Storage: -55℃~+105℃, non operational

Power supply has a 4-20mA industry standard output and an arc detection circuit. The 4-20mA output is proportional to the actual high voltage being supplied to the T Rod electrode(s): 4mA indicates an output voltage near zero volt, 20mA indicates an output voltage 34,000-40,000 volts.

The high-voltage power supply has over-current protection settings, over-voltage protection circuit settings, and arc detection protection circuit settings. If the output current is detected to exceed 1mA, the power will be automatically cut off. The arc detection circuit causes the power supply to stop operating immediately if an arc is detected circuit deactivates the power supply.

The electrical insulation of high voltage power supply is shown in Figure 2-2:

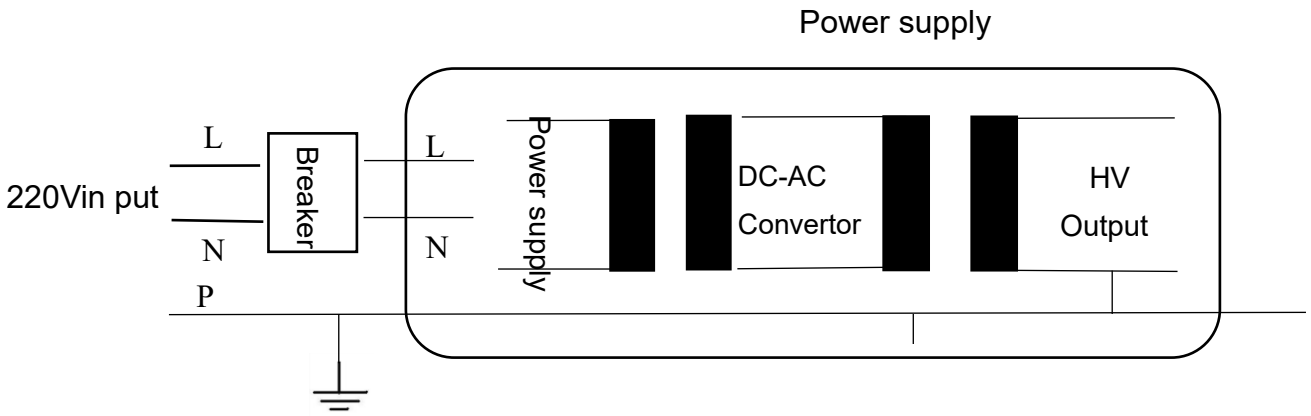

Figure2-2 The electrical insulation and protection circuit

The power supply should be mounted as close as possible to the T Rod electrode(s) it powers so that line loss does not affect operation. Additionally, the power supply enclosures should be positioned so that maintenance personnel can routinely observe the operating condition.

Physical orientation of the enclosure has no effect on operation but it is recommended that the power supply be located so as to prevent unauthorized tampering and possible shock, and so that the status indicators are readily visible.

The size of the distribution box is 520mm×450mm×120mm, the high-voltage power supply module, air switch and grounding wire are integrated in the distribution box. Figure 2-2 shows a typical distribution box

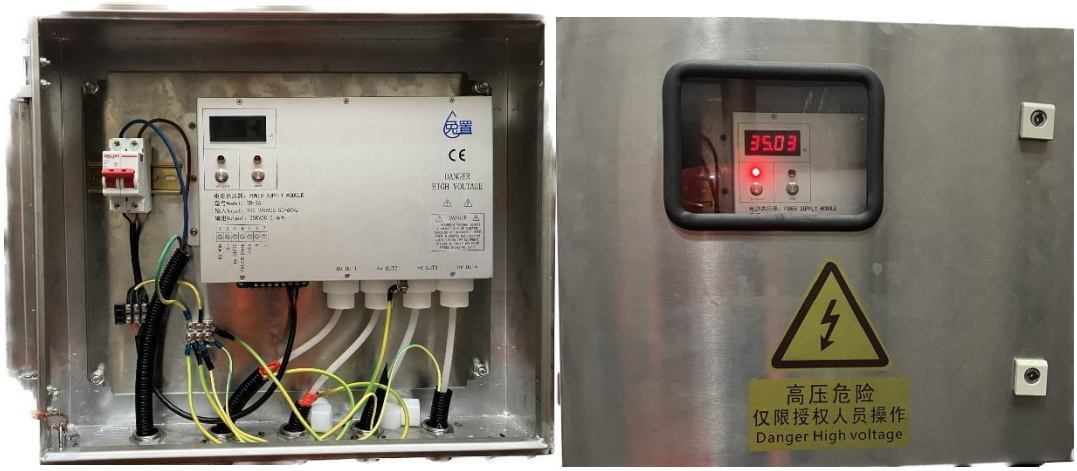

Figure 2-2 distribution box

CAUTION: To ensure proper operation the T Rod electrodes should only be operated after all power supplies and reaction chamber have been properly grounded to a good, reliable electrical ground point and power supplies connected to a source of AC power free of sags, surges or spikes.

ATTENTION: Power Supplies are designed to operate in industrial environments. However, failure may occur if a power supply is repeatedly subjected to extreme surges, sags or spikes. Damage to power supplies resulting from improper input power is not covered under TZ company. warranty.

Caution: Do not switch on the power supply without ground terminal connected it will damage electronics.

Chapter 3: Electrical Safety Specifications

Under normal operating conditions, the T Rod water treatment system exposes suspended particles in the water to an electric field formed by a voltage of 34,000-40,000 volts. The human subconscious mind seems to be a very dangerous voltage; however, the electrified T Rod system is a high voltage but a low current system. Under normal operation, the system is like a capacitor charger which converts 34,000-40,000 volts high voltage from a high-voltage power supply. The total load output of the four T Rod electrodes is actually 0.03-0.08mA, and the maximum output current is 1mA. The actual output current cannot even be measured with an ammeter on site. Therefore, there is no lethal current without safety. There is no risk of electric shock even if a person comes into direct contact with the T Rod electrode or the liquid in which the electrode is immersed. If the system fails due to abnormal operation or other external forces, the high-voltage power supply will immediately cut off the voltage output and at the same time provide a signal to make the RESET button light on the high-voltage power supply shell lights up. Furthermore, the high-voltage power supply has an arc detection circuit design. If it detects faults such as arcing or system short-circuit in the

circuit that supplies power to the T Rod electrode, the arc detection circuit will also stop the high-voltage power supply immediately. Therefore, if an unexpected failure occurs in the system, the high-voltage power supply will immediately stop output due to the voltage drop or arc phenomenon caused by the failure, and the RESET button light on the casing will light up. If the circuit system or the electrode leakage exceeds 1mA, the power supply will be cut off immediately and the REST button will light up. In the part of the fault end, the residual power in the system will gradually decrease and disappear, or the residual power of the system will be exported due to the direct grounding of the fault end; if the fault end directly or indirectly leaks electricity and contacts the human body, the current should belong to sheet3-1 which can escape the influence of current inductance. Moreover, when the system fails, the high-voltage power supply has been immediately stopped at the same time. Therefore, there will be no continuous discharge in the entire circuit system to cause a secondary electric shock hazard.

Sheet3-1 Effects of different currents on the human body

Inductive influence	Current(mA)					
	DC		60Hz VC		10000Hz VC	
	Male	**Female**	Male	Female	Male	Female
Perceived current: Stimulation begins	5.2	3.5	1.1	0.7	12	8
Can escape the current: the muscles can still move freely	62	41	9	6	55	37
Inescapable current: Muscles cannot move freely	74	50	16	10.5	75	50
Shock current: Muscle contraction, dyspnea	90	60	23	15	75	50
Cardioplegic current: ventricular spasm, respiratory arrest	500	500	100	100	500	500

Data source: Naito Katsuji, Lai Gengyangtranslation,1991,"Electrical Safety Textbook Practice", Fuhan Publishing House.

Chapter 4: T Rod electrode

The T Rod electrode consists of a vitrified white ceramic tube, rounded at one end, and mated to a threaded 316 stainless steel fitting.

T Rod Electrode Water treatment System

The ceramic material that forms the T Rod electrode body is durable and resistant to water and most chemicals including strong acids and bases. However, the tube is not shatterproof and may be cracked or broken by a blow from a tool, excessive force during handling or by dropping or striking the T Rod electrode on a hard object or surface. It is recommended that you leave your T Rod electrodes in their original packaging until you are ready to install them.

T Rod ceramic tube length is 36 inch, the total length include the fitting is nearly 47inch, the diameter of tube is 1.25inch.

The equipment conforms to the standard of drinking water system components and food industry requirement.

T Rod is installed in the tank or pool before reverse osmosis RO water intake, such as ultrafiltration water tank, concentrated water tank, etc. If it is used in the cooling circulating water system, it should be installed in the cooling water pool. The on-site installation method and installation location are determined by the professional technicians of TUZHI and the customer on site.

WARNING: To avoid the possibility of an uncomfortable electrical shock, always turn off T Rod electrode- power supplies and allow at least one minute for T Rod electrode charge to dissipate before working on or around the T Rod electrode.

CAUTION: T Rod electrodes are thoroughly tested at the factory prior to shipment. T Rod electrodes can be damaged or broken if they are not handled with care during unpacking, installation or during maintenance of the equipment they protect. Such damage is not covered by your warranty. Such damage may not be visible and may only become apparent when the T Rod electrode fails to operate properly after installation. Any damage to T Rod electrodes caused by mishandling, dropping, striking or other forms of abuse will void your warranty. TZ company recommends that you keep your T Rod electrodes in their original packaging until you are ready to install them and that you handle T Rod electrodes with care during installation.

START- UP CARE

Although T Rod electrodes are quite robust, they may be damaged or broken by the tremendous shear forces generated by a water hammer, or by objects striking them. Therefore, it is necessary to avoid subjecting T Rod electrodes to water hammers. Or to loose objects in the fluid system that could strike the T Rod electrode.

ATTENTION: Damage to T Rod electrodes resulting from shock or vibration from a water hammer or from being struck by a loose object in the fluid in not covered under your TZ company Warranty.

Chapter 5:Connections and Installation

The buyer should provide the construction work, like welding, cable installation and other construction work like provide scaffolding etc.

The supplier personal provide the wire connection and commissioning etc. The supplier also provide the installation drawing to client.

Please ben ensure that the distribution box is properly grounded, and that the shielded wires of the high-voltage cables are properly grounded during installation.

Chapter 6: Troubleshooting

You can use to characterize problems with your T Rod electrode(s) and locate the source of any problems.

If a problem occurs with your system, use the following procedures:

1 Review this section of your manual for problem solving information.

2 Make sure that the power supply has been properly connected to a reliable AC service and is properly grounded. Verify that all wiring connections are tight and correct and all circuit breakers/fuses are in proper position. Check the insulator assemblies on the T Rod electrode are in place and that wire caps are all filled with insulating dielectric grease.

WARNING: Always ensure that the T Rod electrode is discharged and that AC power is disconnected before touching or working on any wire or connection, opening a power supply enclosure, or loosening the wire cap.

3 Read the troubleshooting sections below to attempt to locate the source of the problem and follow the indicated procedures.

4 Switch RESET LED light is on, press the RESET button, if the power can start and operate normally. It means that a slight discharge has occurred in a certain position, and the overall circuit and equipment are not damaged. Continue to use power.

5 If the power supply still does not work normally after pressing RESET, and the voltage does not reach the minimum 34KV, the RESET switch LED indicator faulty indicator light is still on, and the voltage display shows that the voltage is 0 KV. Please follow the troubleshooting methods below

IDENTIFYING THE PROBLEM

WARNING: Substitution of non-TZ company components, connectors, wire, and insulating compound may void your warranty. Only use components and materials supplied by TUZHI company. With your system to install T Rod electrodes, wiring, and power supplies. Damage to your system due to coronal discharge that results from improper installation is not covered under your warranty. Contact TZ company. If you require additional materials or advice to complete your T Rod electrode installation.

WARNING: To prevent electrical shock hazard, always disconnect the power supply from the electrical source and allow the system to discharge (approximately one minute) before touching any wiring. A piece of insulated wire may be used to discharge the T Rod electrode by momentarily touching one end to ground and the other end to the Rod/Power Supply Connection

The volt display screen on the power supply module can not display 34-40 KV (or the volts value dropped when the volt is increasing), and the RESET button LED is light up under the power is connected to power supply module and the ON/OFF button is actvied. Please follow the trouble shooting step to find the fault and find whether the T Rod electrode damaged or wire damaged.

Figure6-1 Picture of distribution box without high voltage output connectors

1　As shown in Figure 6-1, remove the 4 HV OUT connectors from the power supply and then screw on all four attached white plastic threaded connectors with closed bottoms. In this way, the power supply is in the no-load state. Power on, press the ON/OFF button, the ON/OFF LED light is light up, and observe whether the voltage can reach 34-40 KV or not. If everything is normal, then there is nothing wrong with the power supply.

2　If the voltage cannot be raised to the minimum 34KV normally during the startup process, the RESET LED light is on, and the voltage returns to 0KV, then the power supply has failed. Contact the manufacturer to replace the power supply.

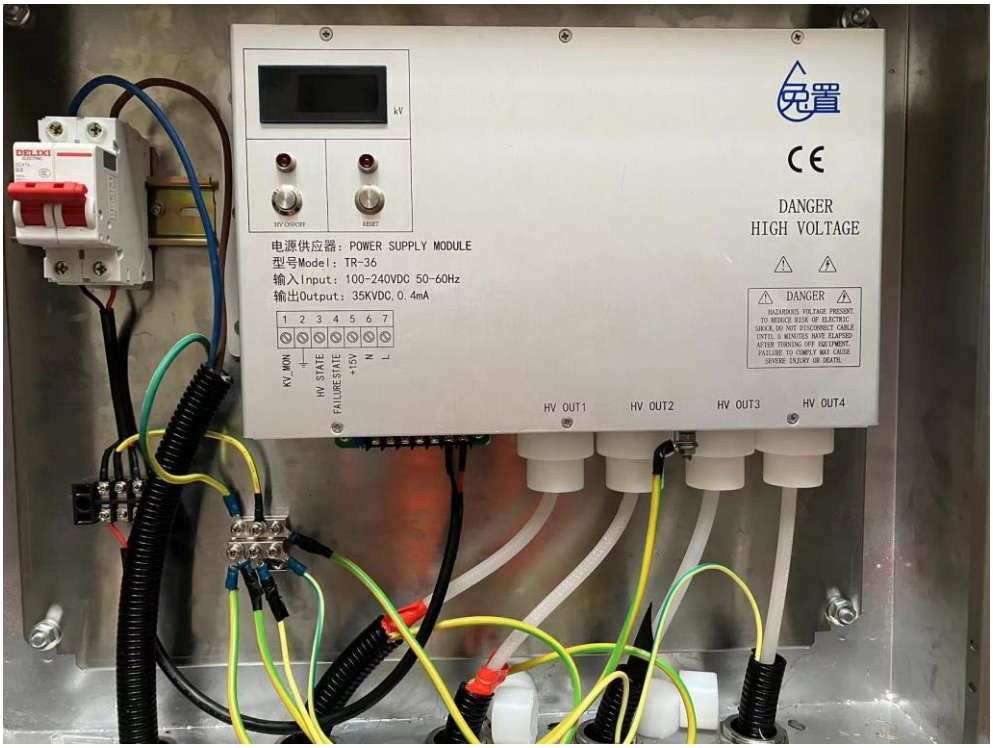

Figure 6-2 Distribution box high voltage output wiring diagram

3 As shown in Figure 6-2, after power off, install the HV OUT1 cable connector first, then turn on the power, press the ON/OFF button, and observe whether the voltage on the voltage display can reach the minimum 34-40 KV normally or not, if the voltage can reach 34-40 KV and remain stable , and RESET LED light is off, then this cable and T Rod electrode is normal.

4 If the volt cannot start normally, for example, the voltage value drops during the volts rising process, and then the RESET LED light is on, it indicates that the cable or T Rod electrode is faulty.

5 If there is a connector between the power supply and the T Rod electrode for this wire, disconnect the connector and repeat the check. After disconnecting the connector, test the wire separately. If the power supply works normally, it indicates that the cable works normally. If the power supply fails to work after connecting the connector, it indicates that the T Rod electrode is faulty. Contact the manufacturer to replace the electrode.

6 Follow 1 2 3 4 steps to repeat HV OUT 2, 3, 4 circuits. Until it is determined which wire or T Rod electrode is faulty.

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