

KDDQ 2678 系列水内冷发电机绝缘特性测试仪



# KDDQ 2678 系列 水内冷发电机绝缘特性测试仪

Water-Cooled Dynamotor  
Insulation Tester



使用说明书

User's Manual

武汉市康达电气有限公司

Wuhan Kangda Electrical Co., Ltd

# KDDQ 2678 系列水内冷发电机绝缘特性测试仪

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# KDDQ 2678 系列水内冷发电机绝缘特性测试仪

**尊敬的用户：原 KD2678 系列水内冷发电机绝缘特性测试仪全新改款升级为 KDDQ 2678 系列。为了您的安全和保障仪表正常使用，请先仔细阅读完此说明书，再进行操作。**

本仪器安全性能符合国际标准 IEC61010-1: 2001。

本仪器执行标准 Q/WKD10。

- 请使用 220V 电网交流电源（严禁接入 380V）。
- 在测试和检定中应使用随仪表配置的测试线，以保证工作和检定正常。
- 确定所有测试导线与仪表的测试端口连接正确、牢固。
- 请勿在仪器表面潮湿或操作者手潮湿时操作。
- 测量中或刚完成测试请勿立刻触摸被测回路。以免导致触电事故。
- 测试线或端口发现易损害绝缘特性的污垢或炭化物时请停止测试。
- 若仪器出现异常请停止使用。例如：仪器破损或裸露出金属部分。
- 请勿在高温、潮湿、容易跌落、有结露可能的场所及阳光直射下长时间放置。
- 应经常保持外表与测试头的清洁，必要时请使用湿布或清洁剂来清洁仪器外壳，请勿使用研磨剂或溶剂。
- 仪器潮湿时，请先干燥后存储。

## 1. 性能特点

- 适用于测量水内冷发电机的绝缘电阻、吸收比（R60S/R15S）和极化指数

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(R10min/R1min)

- 量程范围: 量程最高可达  $100\text{G}\Omega$  (D 型), 最低至  $1\text{M}\Omega$  (2500V) /  $2\text{M}\Omega$  (5000V)
- 实时显示工况: 实时显示输出电压、水支路电阻, 准确反应现场工况。
- 极化电势自动补偿: 使用基于等电位大电流屏蔽的电流测量装置专利技术; 自动对各种极化电势进行有效补偿调节, 补偿能力进一步增强。机座与汇水管间的电阻小至  $3\text{K}\Omega$  即可保证测量准确度。
- 输出功率大: 输出功率、带载能力大幅提高。输出电流最高可达  $100\text{mA}$ , 线路对汇水管间的负载电阻低至  $25\text{k}\Omega$ , 2500V 时、负载电阻  $50\text{k}\Omega$ , 5000V 时端口电压跌落  $<10\%$  (D 型)。
- 过载保护功能: 水阻很低甚至短路时, 自动关闭高压, 保障测试仪不损坏。
- 7 寸触摸彩屏: 同屏实时显示各参数: 实际输出电压、水支路电阻、 $R_t$ 、 $R_{15S}$ 、 $R_{60S}$ 、 $R_{10\text{min}}$ 、吸收比和极化指数等, 一目了然掌握现场工况。测试时, 绝缘电阻值用数字和虚拟指针双显示方式实时同步显示。虚拟指针对数刻度, 示值跳动小, 直观显示容性试品的测试过程, 数字显示测量值方便读数。
- 智能化操作: 文字提示操作步骤及测试状态。可对测试中现场的问题, 提供分析和操作提示。提高测试效率。(仅 D 型具备测试问题诊断分析功能)。
- 自动测量并同屏显示  $R_{15s}$ 、 $R_{60s}$ 、 $R_{10\text{min}}$  绝缘电阻, 自动计算吸收比和极化指数。

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## 2. 技术指标

### 2.1 主要技术指标

型 号	KDDQ2678A	KDDQ2678B	KDDQ2678C	KDDQ2678D
额定电压 (V)	2500	5000	2500 / 5000	2500 / 5000
带载能力 (绕组对汇水管水电阻)	50 k $\Omega$	100 k $\Omega$	40 k $\Omega$ / 2500V 80 k $\Omega$ / 5000V	25 k $\Omega$ / 2500V 50 k $\Omega$ / 5000V
最大输出 (短路) 电流	50mA	50mA	60mA	100mA
汇水管对机座 极限电阻	3 k $\Omega$			
测量范围	1M $\Omega$ ~20G $\Omega$	1M $\Omega$ ~20G $\Omega$	1M $\Omega$ ~50G $\Omega$	1M $\Omega$ ~100G $\Omega$
准确度等级	10			
基本误差 10%的范围 (无水支路电阻)	1M $\Omega$ ~10G $\Omega$	1M $\Omega$ ~5G $\Omega$	1M $\Omega$ ~10G $\Omega$	1M $\Omega$ ~10G $\Omega$
基本误差 20%的范围 (无水支路电阻)	10~20 G $\Omega$	10~20G $\Omega$	10~20G $\Omega$	10~20G $\Omega$
水支路电阻 引入误差	1M $\Omega$ ~1G $\Omega$ $\leq$ 5% 1 $\Omega$ ~5G $\Omega$ $\leq$ 10%			

### 2.2 其它指标 Other specifications

- 绝缘电阻: 50 M $\Omega$  (1000V) (测量线路与外壳间)
- 耐压: AC 3kV 50Hz 1min (测量线路与外壳间)
- 工作温度与湿度: 0 $^{\circ}$ C ~ +50 $^{\circ}$ C 85%RH
- 贮存温度与湿度: -10 $^{\circ}$ C ~ +70 $^{\circ}$ C 90%RH
- 电源: AC 220V (1 $\pm$ 10% ), 50Hz  $\pm$ 0.1Hz
- 耗电: <1000W
- 外形尺寸: 398mm (L)  $\times$  288mm (W)  $\times$  200mm (D)
- 重量:  $\approx$  8.5 kg

注: 此说明书所述技术指标仅适于您现用的仪表, 如有改动恕不另行通告。



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## 3. 仪器外观和测量界面

### 3.1 仪器外观

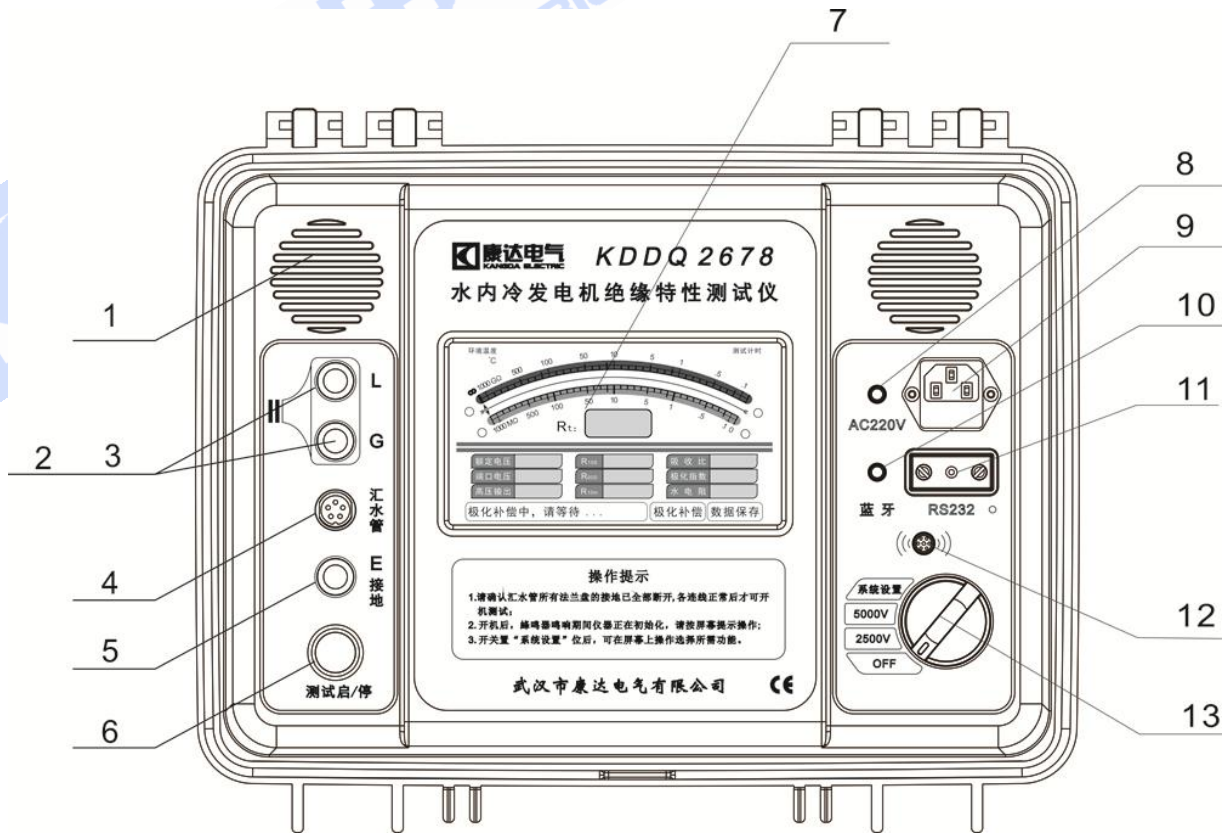


图 1 面板示意图 Figure 1 Panel Diagram

1. 散热风扇	2. 3. 带屏蔽高压端插座 (L/G)	
4. 汇水管端插座	5. E 端插座	6. “测试启/停”按钮
7. LCD 显示屏	8. 电源指示灯	9. 电源插座/备用保险管
10. 蓝牙指示灯 (暂不支持)	11. 通讯串口 (暂不支持)	12. 蜂鸣器
13. 功能/电压 选择开关		

### 3.2 测量界面

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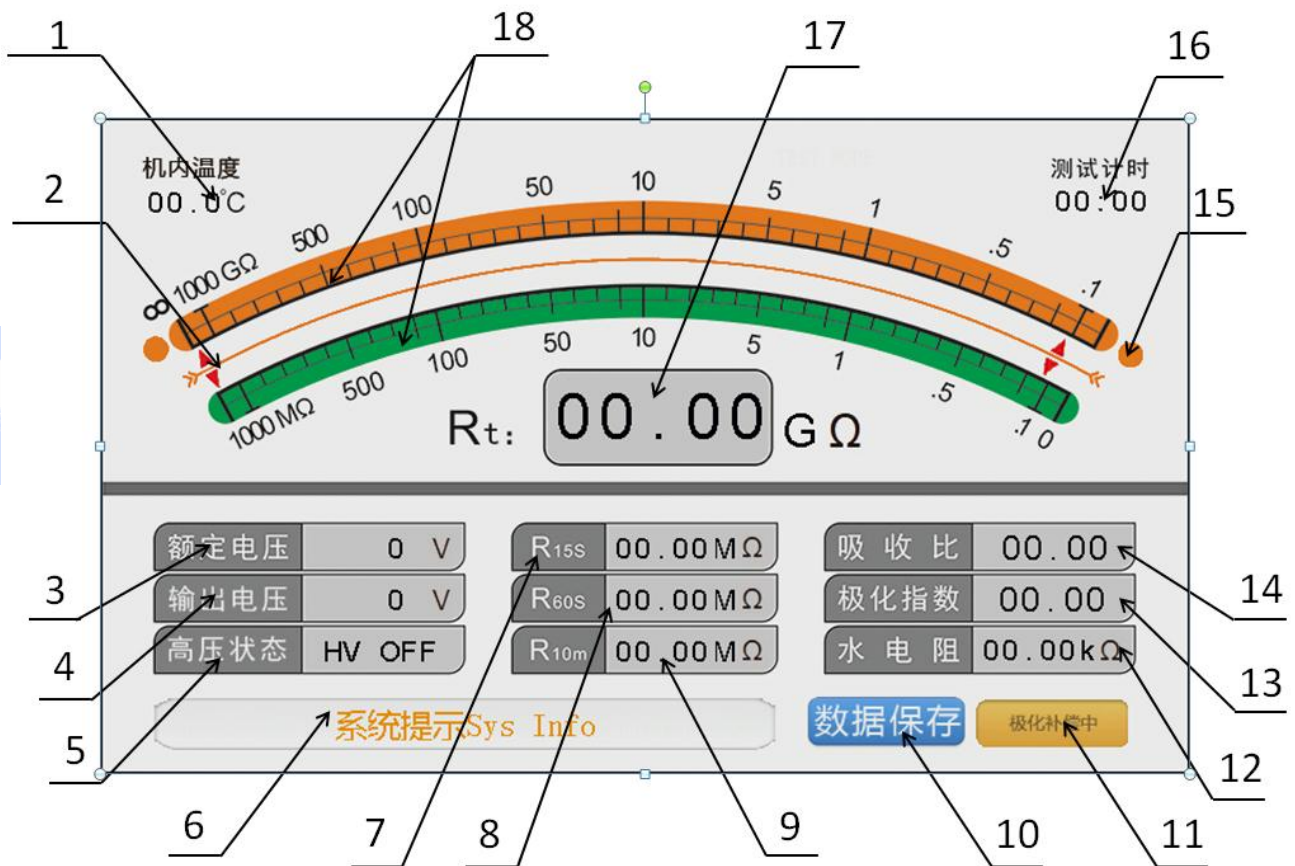


图 2 测量界面介绍

1) 环境温度显示	2) 指针	3) 额定电压显示
4) 输出电压显示	5) 高压状态	6) 状态/操作提示
7) R15s 示值	8) R60s 示值	9) R10min 示值
10) 数据保存按钮	11) 极化补偿按钮	12) 水电阻示值
13) 极化指数示值	14) 吸收比示值	15) 上/下刻度指示灯

测量界面功能说明如下：



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## 1) 环境温度显示

显示仪表使用场所实时温度。

## 2) 虚拟指针

界面的正上部分为 **模拟式刻度盘**（18），用于在测量中直观指示当前的电阻值。刻度盘的左右两侧配有 **上下刻度指示灯**（15），用于指示当前的有效刻度为上刻度还是下刻度。

## 3) 3、额定电压显示

显示使用“功能/电压 选择开关”选择的额定电压

## 4) 输出电压显示

显示实际输出的测试电压

## 5) 高压状态

显示高压开关状态。“HV OV”表示高压已启动，“HV OFF”表示高压已关闭。

## 6) 6、状态/操作提示

文字提示操作步骤及测试状态。

## 7) R15s 示值

显示持续测试 15s 时绝缘电阻值。

## 8) R60s 示值

显示持续测试 60s 时绝缘电阻值。

## 9) R10min 示值

显示持续测试 R10min 时绝缘电阻值。

## 10) 数据保存按钮

手动保存当前已有的测量数据，点按后，**状态提示（6）** 会提示“数据已保存”。

## 11) 极化补偿

仪表开机时会自动进行极化补偿，重新测量或如果需要重新进行极化补偿，可以通过操作 **极化补偿按钮（11）** 按钮重新进行极化补偿。

**注意！**在极化补偿时请务必确认高压已关闭，然后按下屏幕右下角的 **极化补偿按钮（11）**，此时机器发出长鸣声，同时屏幕左下角信息栏显示“极化补偿中，请等待”字样。当极化补偿结束，机器停止长鸣，同时左下角信息栏显示“极化补偿结束，可开启高压测试”字样，此时可以点按“**测试启/停**”按钮 开启高压进行测量。

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## 12) 水电阻示值

实时测量显示测试工况水支路电阻值

## 13) 极化指数示值

显示同一次试验中,测得 10min 时的绝缘电阻值与 1min 时的绝缘电阻值之比。

## 14) 吸收比示值

显示同一次试验中,测得 60s 时的绝缘电阻值与 15s 时的绝缘电阻值之比。

## 15) 上/下刻度指示灯

用于指示当前的有效刻度为上刻度还是下刻度。

## 16) 计时器显示

显示测试时长。

## 17) 绝缘阻值 $R_t$ 显示

显示当前实时绝缘电阻值。

## 18) 测量值对数折线刻度

用于在测量中直观指示当前的电阻值。

## 4. 测试前准备及仪表自检

### 4.1 测试前准备

#### 4.1.1 试测条件判断:

- 测试前请确保现场测试条件满足测试要求,以保障正常测试及测试结果真实准确性。
- 用万用表“电阻”档测量汇水管对机座电阻  $R_{GE}$ 、绕组对汇水管电阻  $R_{LG}$ 。判断是否满足该型号仪表要求。
- 用万用表“直流 mV”档测量汇水管对机座之间电压值应 $<500\text{mV}$ 。汇水管对机座  $R_{GE}$  电阻值应 $>3\text{k}\Omega$ 。

#### 4.1.2 仪表自检:

- 检查电源线是否正常接入,电源接入后仪表内部风扇开始工作。将仪表在开路状态下开启高压,检查输出电压是否正常;
- 测试一个模拟电阻(比如标准电阻),检查电压和阻值显示是否正常;(不用接入汇水管线)

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## 4.2 电源和测试线的连接

接通 220V 电网交流电源（严禁接入 380V）。电源插入后，仪器内部的风扇会开始转动，但屏幕不亮，表示电源已接入且有电。仪器测量和其他功能需要通过波段开关选择才能启动。

请使用随机器配置的专用测试线，分别接通仪器的“L/G（绕组）”、“汇水管”、“E（机座）”端与对应的各测试点。发电机有多个汇水管出口时，应用截面大于 2.5mm<sup>2</sup> 的铜导线将各汇水管口连接。

线路端红色高压测试线插入仪表的方向，应与示意图一致。

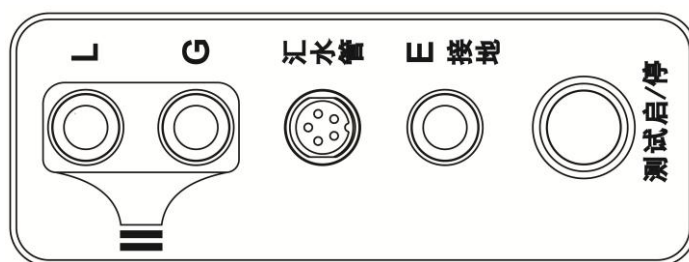


图 3 仪表接线端子

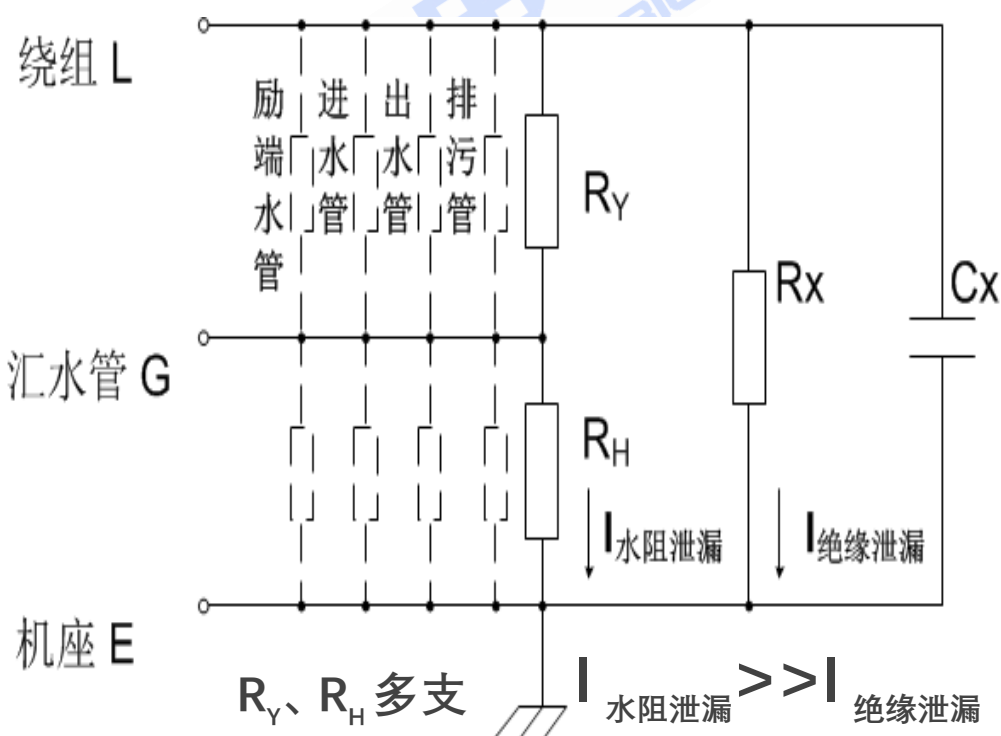


图 4 仪表接线与被测发电机等效电路图

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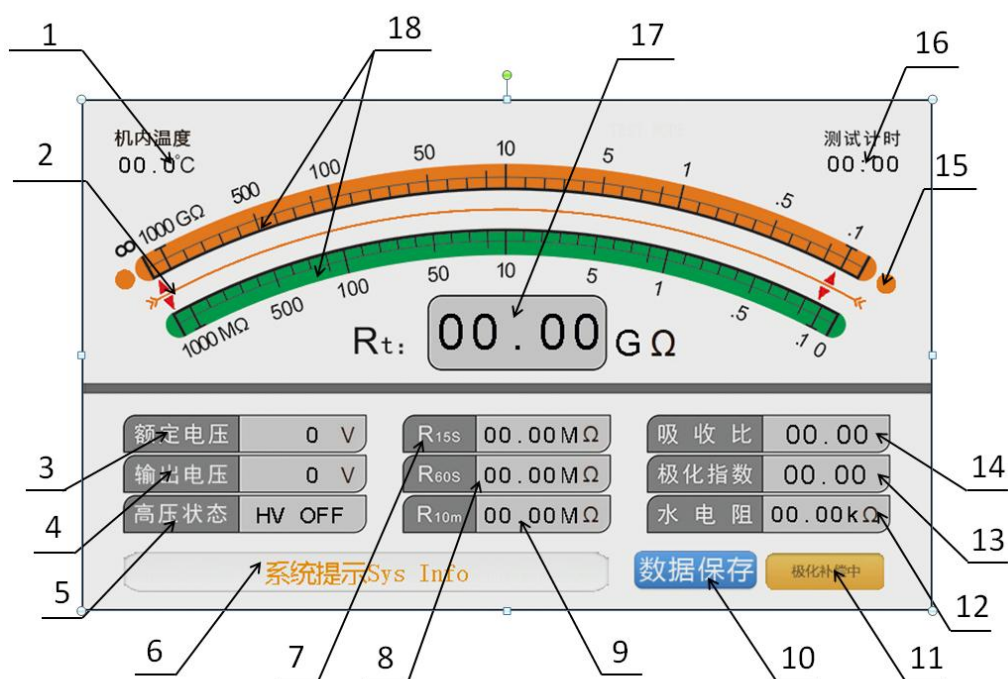
## 5. 操作说明

### 5.1 开机

电源和测试线连接无误后，请将 功能/电压选择开关 从 OFF 档旋转至合适的额定电压档，此时仪器屏幕将显示如图 5 所示的欢迎界面，同时仪器开始进行初始化。初始化结束后将会跳转到测量界面如图 6。



图 5 初始化欢迎界面



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图 6 测量界面

## 5.2 绝缘电阻测量

初始化欢迎界面结束后，测试仪会自动进入测量界面。

本仪器有自动极化补偿功能，当开机第一次进入测量界面时会自动进行一次极化补偿，仪器发出“滴滴滴”间隔鸣叫提示音，LCD 屏上状态提示栏(6)显示：“极化补偿中，请等待…”，此时请等待机器极化补偿完毕再进行操作。

当极化补偿完毕，状态提示栏(6)将会显示“极化补偿结束，可开启高压测试”字样，此时可以点按“测试启/停”按钮 开启高压进行测量。

要进行测量时，请点按“测试启/停”按钮 一次，此时高压开启，测量界面上的 高压状态项(5)显示“HV ON”字样，“测试启/停”按钮 内的红色 LED 灯亮起，同时机内蜂鸣器长鸣提示高压已开启，仪器开始进行阻值测量。

此时，“L(绕组)”端与“E(机座)”端之间已施加高电压，请注意安全！

测量开始后，额定电压(3)显示当前选定的电压档位，输出电压(4)显示当前实际输出电压值，Rt(17)显示当前实时绕组电阻值，水电阻(12)显示当前实时水电阻值。当测量进行到第 15 秒、第 60 秒、第 10 分钟时，将会显示相应时刻的测量电阻数值到对应位置，同时第 60 秒会计算出吸收比显示至吸收比显示框(14)，在第 10 分钟会计算出极化指数显示到极化指数显示框(13)。

此时如果测量时长大于 15 秒，机器将自动记录一组测量数据到数据记录中。本机最长测试时间约为 10 分 10 秒。

测试完毕后，点按“测试启/停”按钮，关闭高压。待试品上的残余电荷泄放完后将功能开关置 OFF 位，关断电源。最后拆下测试线，以免电击伤人。

在测量过程中请勿转换功能开关，否则高压将关闭，测试停止。

提示：当水阻太低，负载过重时，输出高压将自动降低，影响测试精度。为保证测试精度，应降低水电导率，提高水阻后，再进行测试。



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## 5.3 系统设置及数据查询

不启动高压时，仪器可进行设备及数据查询

### 5.3.1 时间设置

将 功能/电压选择开关 旋转至系统设置档即可进入系统设置界面，界面布局如图 7 所示。



图 7 系统设置菜单

点击 时间设置 选项可以进入时间设置界面，界面如图 8 所示。

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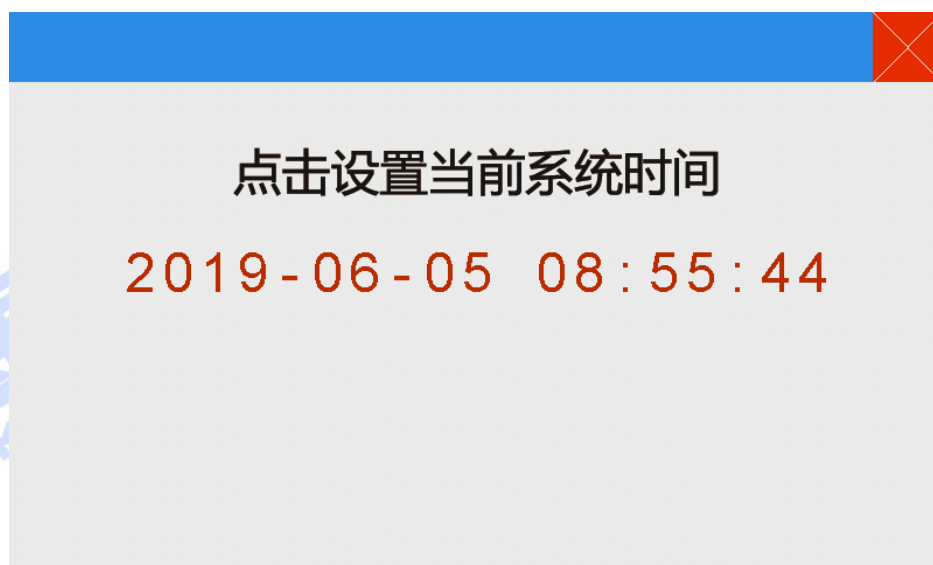


图 8 时间设置界面

在时间设置界面中，点击界面的红色时间字体将会弹出设置键盘，输入正确的时间日期后点击回车按钮保存即可。请务必设置正确的时间日期，否则将导致无法正确记录当前的测量时间。当完成所有设置，可以点击右上角关闭按钮返回上一级菜单，或者将 **功能/电压选择开关** 旋转至测量档返回测量界面。

## 5.3.2 数据查询

点击 **数据查询** 选项可以进入数据查询界面，如图 9 所示。



图 9 数据查询界面

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在此界面可以查询历次测量中保存的测量数据。所有数据按照保存时间的先后排序，先保存的在前，后保存的在后。点击右下角的上下页翻页按钮可以在不同记录中跳转。如果要清空当前保存的所有测量记录，请点击右下角的 **清空所有记录** 按钮，此时将会弹出清空确认界面，如图 10 所示。点击 **是** 便可以清空所有存储的测量数据。

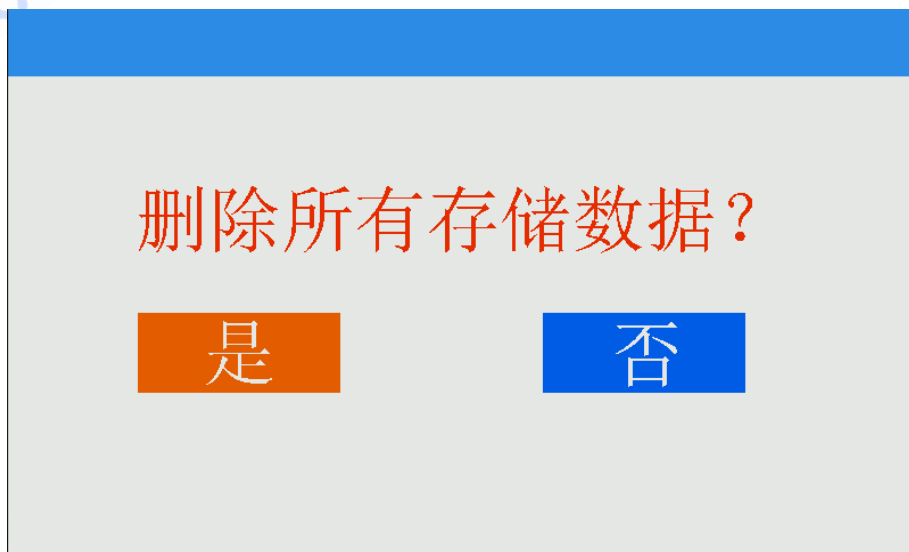


图 10 清空确认界面

## 6. 更换保险管



图 1



图 2



图 3

保险管位于电源插座口，用工具在图 1 箭头处向上撬起，打开保险管盒更换保险管。

## 7. 产品附件清单

序号	名称	规格	计量单位	数量
1	“L、G” (绕组) 带屏蔽高压连接线双插头 (红)	12m	根	1
2	“E 接地” 机座连线 (黑)	3m	根	1
3	专用汇水管连线 (黑)	20m	根	1
4	AC 220V 电源线	1m	根	1
5	多功能接头	探针、鳄鱼夹可调换		
6	备用保险管	10A	个	1
7	标准电阻		个	1
8	铝合金外箱	带拉杆滚轮	个	1
9	说明书		份	1
10	合格证		份	1



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## 7. 常见现象及说明

常见现象	说明及处置
开机后显示屏无显示。	检查 220V 交流电源是否可靠接入。
无测试数据显示。	测试线和被测试品间可能接触不良，接线顺序和方向可能有误。
	按一下测试开关按钮，显示屏上高压状态栏应显示 HV ON。
	被测试品的绝缘电阻值超过了仪表量程的上限值或开路。
输出的高压达不到额定值。	被测试品的阻值太小拉低了输出电压。
	绕组对汇水管的水阻过低，注意 2500V 档应大于 20k $\Omega$ ，5000V 档应大于 30k $\Omega$ 。
	用于校检的电压表内阻过低。 绝缘特性测试仪电压等级为 2500V、5000V 档，校测电压表内阻应高于 1G $\Omega$ 。
保存数据时提示数据已满。	内部存储空间已存满，请在数据查询界面清空数据后重试。



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## 8. 计量器具型式批准证书

		经批准的计量器具新产品（名称、型号）： 绝缘特性测试仪	
序号	型号	规格	准确度
1	KD2678	2500V (0~10) GΩ	10级
(以下空白)			
中华人民共和国 <b>计量器具型式批准证书</b> 武汉市康达电气有限公司		根据中华人民共和国计量法第十三条和中华人民共和国计量法实施细则有关规定，对你单位申请型式批准的计量器具新产品经审查合格，现予批准，并可使用以下标志和编号：  12E043-42 批准人：陈冬	
		发证日期：2012年7月16日 发证机关（盖章）： 	

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## 本公司制造的各类仪表

<p><b>绝缘类:</b></p> <p><b>KD2676E</b> (指针式) 绝缘电阻表 5kV/10kV/ 1T Ω</p> <p>➤ <b>KD2676F</b> (指针式) 绝缘电阻表 2.5kV/5 kV/ 500G Ω</p> <p>➤ <b>KD2676G</b> (指针式) 绝缘电阻表 0.5kV/1 kV /2.5 kV / 40G Ω</p> <p>➤ <b>KD2671A</b> (数显式) 绝缘电阻表 250V/500V/1000V/2500 200G Ω</p> <p>➤ <b>KD2671B</b> (数显式) 绝缘电阻表 500V/1000V/2500/5000V 500G Ω</p> <p>➤ <b>KD2677C1</b> (数显式) 绝缘电阻测试仪 0.5kV/1 kV /2.5 kV/5 kV / 500 Ω</p> <p>➤ <b>KD2677C</b> (数显式) 绝缘电阻测试仪 0.5kV/1 kV /2.5 kV/5 kV / 2T Ω</p> <p>➤ <b>KD2677E</b> (双显式) 绝缘特性测试仪 5 kV /10kV / 2T Ω</p> <p>➤ <b>KD2677F</b> (双显式) 绝缘特性测试仪 2.5kV/5 kV / 1T Ω</p> <p>➤ <b>KD2677G</b> (双显式) 绝缘特性测试仪 0.5kV/1 kV /2.5 kV/5 kV / 1T Ω</p> <p>➤ <b>KD2677HV-5/-10</b> 强抗干扰绝缘特性测试仪</p>	<p><b>接地、防雷类:</b></p> <p>KD2571B2 接地电阻表</p> <p>KD2571BV 接地电阻测试仪</p> <p>KD2571P1 接地电阻表</p> <p>KD2571C1 大型地网接地电阻测试仪</p> <p>KD2531T2 等电位连接导通测试仪</p> <p>KD2531E 地网导通测试仪</p> <p>FC-2G 防雷元件测试仪</p> <p>KDFC-2GH1 多功能便携式防雷元件测试仪</p> <p>KDFC-2Gh SPD 综合测试仪(四合一测试)</p> <p><b>专用仪表:</b></p> <p><b>大型地网接地参数测试系统</b></p> <p>KD2571D 大型地网接地阻抗测试仪</p> <p>KD2293 地网电压测试仪</p> <p>KD2571-FL 地网分流向量测试仪</p> <p><b>水内冷发电机绝缘特性测试仪</b></p> <p>KDDQ2678A 2.5kV/ 20G Ω</p> <p>KDDQ2678B 5kV / 20G Ω</p> <p>KDDQ2678C 2.5kV/ 5kV / 50G Ω</p> <p>KDDQ2678C 2.5kV/ 5kV / 50G Ω</p> <p><b>KD2677HV 强感应电下绝缘电阻测试成套设备</b></p> <p>KDSJ 水内冷发电机绝缘电阻测试仪检定平台</p> <p>KDJF 防雷元件测试仪检定平台</p> <p>KDVI 接地工频特性参数测试仪校准系统</p>
 <p>鄂制01000177号</p>	

## KDDQ 2678 系列水内冷发电机绝缘特性测试仪

**Dear user : The original KD2678 Series Insulation Characteristic Tester for Water-cooled Generator has been upgraded to KDDQ 2678 Series. For your safety and proper usage of the instrument, please read this user guide carefully before operation.**

**This instrument complies with IEC61010-1:2001 and Q/WKD10.**

- Please use 220V AC power supply.
- The test line with instrument configuration should be used in test and verification to ensure normal work and verification.
- Make sure that all test wires are connected to the test port of the instrument correctly and firmly.
- Do not operate when the instrument surface is wet or the operator's hands are wet.
- Do not touch the circuit under test immediately during or just after the test is completed.
- Stop testing when dirt or carbide is found on the test line or port which is liable to damage the insulation characteristics.
- If the instrument is abnormal, please stop using it. For example, the instrument is damaged or metal part is exposed.
- Do not place it for a long time under high temperature, humidity,

## KDDQ 2678 系列水内冷发电机绝缘特性测试仪

easy falling, possible dew and direct sunlight.

- Always keep the appearance and test head clean. If necessary, use wet cloth or detergent to clean the instrument shell. Do not use abrasive or solvent.
- When the instrument is wet, please dry it first and store it later.

# KDDQ 2678 系列水内冷发电机绝缘特性测试仪

## 1. Features

- Suitable to measure insulation resistance, absorption ratio ( $R_{60S}/R_{15S}$ ) and polarization index ( $R_{10min}/R_{1min}$ ) of water-cooled dynamotor.
- Range: up to 100G\_(D type) and down to 1M\_(2500V)/2M\_(5000V).
- Real-time display of working conditions: real-time display of output voltage, water branch resistance, accurately reflect the field working conditions.
- Automatic Polarization Potential Compensation: The patented technology of current measuring device based on equipotential large current shielding is used, and various polarization potential is automatically compensated and adjusted effectively, and the compensation ability is further enhanced. The resistance between the base and the catchment pipe is as small as 3K to ensure the accuracy of measurement.
- High output power: output power and load capacity are greatly improved. The output current can reach up to 100 mA. The load resistance of the line to the water catchment pipe is as low as 25 k $\Omega$ . At 2500 V, the load resistance is 50 k $\Omega$ . At 5000V, the voltage drop of the port is less than 10% (D type).
- Overload protection function: When water resistance is very low or even short circuit, the high voltage is automatically closed to ensure that the tester is not damaged.
- 7-inch touch color screen: real-time display of parameters on the same screen: actual output voltage, water branch resistance,  $R_t$ ,  $R_{15S}$ ,  $R_{60S}$ ,  $R_{10min}$ , absorption ratio and polarization index, etc., to grasp the working conditions at a



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glance. When testing, the value of insulation resistance is displayed synchronously in real time by double display of digital and virtual pointers. Virtual pointer logarithmic calibration, small indication jump, intuitive display of the test process of the capacitive test, digital display of the measured value for easy reading.

- Intelligent operation: text prompt operation steps and test status. It can provide analysis and operation hints for the problems on the spot in the test. Improve test efficiency. Only Type D has the function of diagnosing and analyzing test problems.
- The insulation resistance of R15s, R60s and R10min is automatically measured and displayed on the same screen, and the absorption ratio and polarization index are automatically calculated.

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## 2. Specifications

### 2.1 Main specifications

Model	KDDQ2678A	KDDQ2678B	KDDQ2678C	KDDQ2678D
Rated Voltage	2500	5000	2500 / 5000	2500 / 5000
Carrying capacity (Winding resistance to catchment water)	50 kΩ	100 kΩ	40 kΩ / 2500V 80 kΩ / 5000V	25 kΩ / 2500V 50 kΩ / 5000V
Maximum Output (Short Circuit) Current	50mA	50mA	60mA	100mA
Limit Resistance of Drainage Pipe to Stand	3 kΩ			
Range	1MΩ~20GΩ	1MΩ~20GΩ	1MΩ~50GΩ	1MΩ~100GΩ
Accuracy	10			
Range for Accuracy ≤ 10% (Anhydrous branch resistance)	1MΩ~10GΩ	1MΩ~5GΩ	1MΩ~10GΩ	1MΩ~10GΩ
Range for Accuracy ≤ 20% (Anhydrous branch resistance)	10~20 GΩ	10~20GΩ	10~20GΩ	10~20GΩ
Error introduced by resistance of water branch	1MΩ~1GΩ ≤5% 1Ω~5GΩ ≤10%			

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## 2.2 Other specifications

- Insulation resistance: 50 MΩ (1000V) (line to instrument case)
- Withstand voltage: AC 3kV 50Hz 1min (line to instrument case)
- Wording conditions: 0°C ~ 50°C 85%RH
- Storage conditions: -10°C ~ +70°C 90%RH
- Power supply: AC 220V (1±10% ), 50Hz±0.1Hz
- Power dissipation: <1000W
- Dimensions: 398mm(L)×288mm(W)×200mm(D)
- Weight: ≈ 8.5 kg

Note: The technical specifications described in this instruction are only suitable for your existing instruments. No further notice will be given if any changes are made.

## 3. Appearance of instrument and measurement interface

### 3.1 Instrument Outline

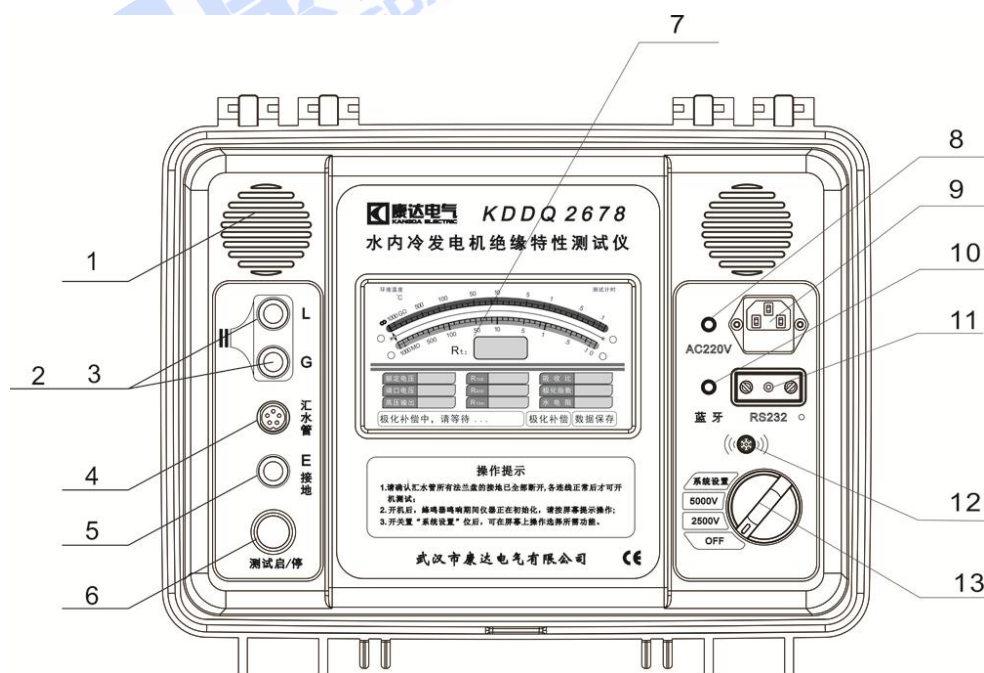


Figure 1 Panel Diagram

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1. Cooling fan	2. 3. High Voltage Terminal Socket with Shield (L/G)	
4. Test hole for water pipe	5. E-terminal socket	6. H. V. ON-OFF button
7. LCD Display Screen	8. Power supply indicator	9. Power socket/spare fuse
10. Bluetooth indicator lamp (Numbered Mode)	11. Communication serial port (Numbered Mode)	12. Buzzer
13. Function/Voltage Selection Switch		

## 3.2 Measuring interface

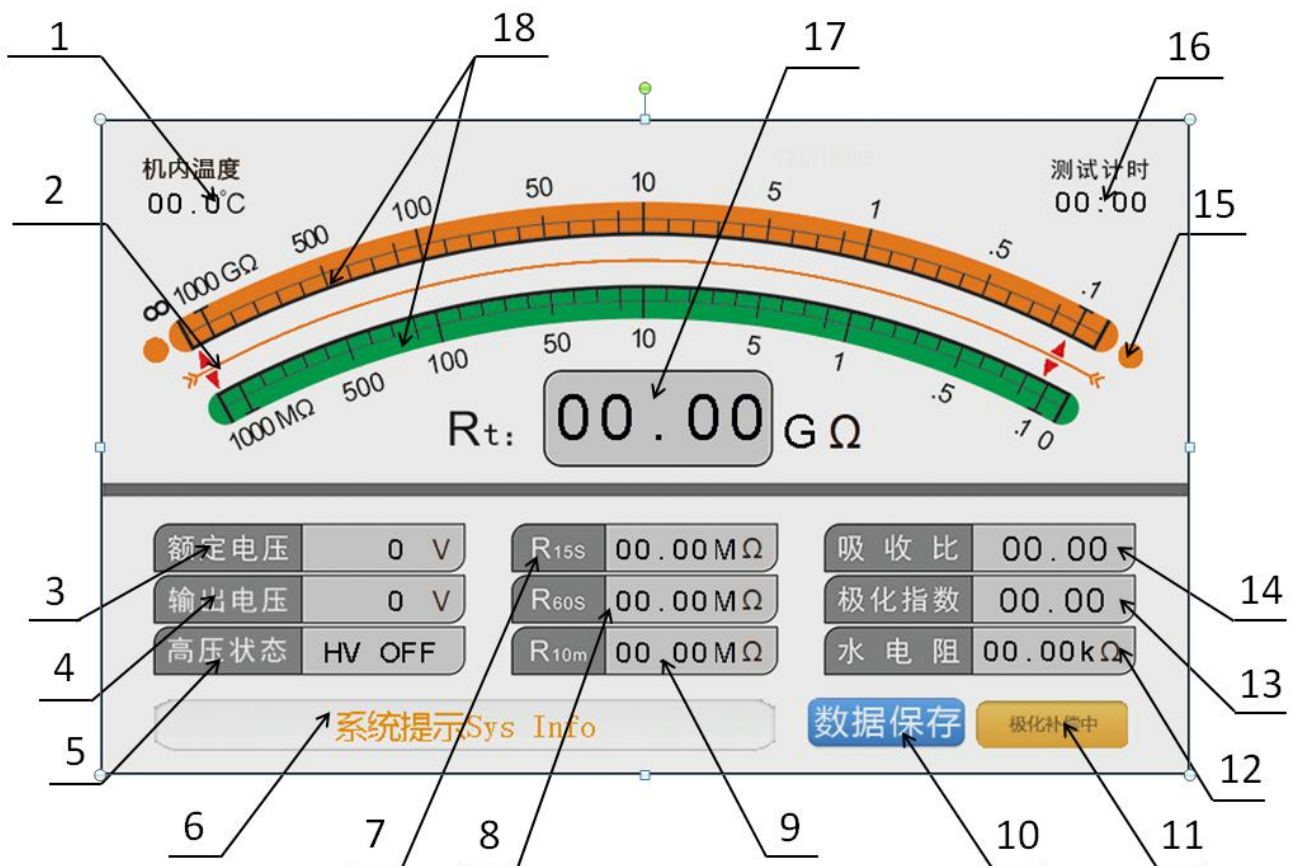


Figure 2 Introduction of Measurement Interface

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1) Ambient temperature display	2) Pointer	3) Rated voltage display
4) Output Voltage Display	5) High pressure state	6) Status/Operational Tips
7) R15s indication	8) R60s 示值	9) R10min indication
10) Data Save Button	11) Polarization Compensation Button	12) Indicative value of water resistance
13) Indicator of polarization index	14) Absorption ratio indication	15) Upper/Lower Scale Indicator Lamp

The measurement interface functions are described as follows:

## 1) Ambient temperature display

Display the real-time temperature of the instrument.

## 2) Virtual pointer

The upper part of the interface is an virtual analog display (18), which is used to intuitively indicate the current resistance value in measurement. The left and right sides of the dial are equipped with upper and lower scale indicator lights (15) to indicate whether the current effective scale is upper or lower.

## 3) Rated voltage display

Display rated voltage selected by "Function/Voltage Selection Switch"

## 4) Output Voltage Display

Display the actual output test voltage

## 5) High pressure state

Display high voltage switch status. "HV OV" means that the high voltage has been started, and "HV OFF" means that the high voltage has been turned off.

## 6) Status / operation tips

Word prompt operation steps and test status.

## 7) R15s indication

Display insulation resistance value for continuous testing for 15



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seconds.

## 8) R60s indication

Display the insulation resistance value of continuous test for 60 seconds.

## 9) R10min indication

Display insulation resistance values for continuous test of R10 min.

## 10) Data Save Button

Manually save the existing measurement data. After clicking, the status prompt (6) will prompt "the data has been saved".

## 11) Polarization compensation

When the instrument starts, it will automatically compensate for polarization. If it needs to be re-measured or re-compensated for polarization, it can be re-compensated by operating the Polarization Compensation Button (11).

Be careful! When compensating for polarization, make sure that the high voltage is off, then press the polarization compensation button (11) in the lower right corner of the screen. At this time, the machine emits a long beep. At the same time, the information bar in the lower left corner of the screen shows the words "in polarization compensation, please wait". When the polarization compensation is over, the machine stops ringing. At the same time, the information bar in the lower left corner shows the words "polarization compensation is over, high voltage test can be opened". At this time, the high voltage can be measured by pressing the "test start/stop" button.

## 12) Indicative value of water resistance

Real-time measurement and display of resistance value of water branch under test condition.

## 13) Indicator of polarization index

It shows that in the same test, the ratio of insulation resistance at 10 minutes to that at 1 minute is measured.

## 14) Absorption ratio indication

It shows that in the same test, the ratio of insulation resistance

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value at 60s to that at 15s is measured.

## 15) Upper/Lower Scale Indicator Lamp

Used to indicate whether the current effective scale is upper or lower.

## 16) Timer display

Display test time.

## 17) Insulation Resistance Value Rt Display

Display the current real-time insulation resistance value.

## 18) Logarithmic Bending Calibration of Measured Values

Used to intuitively indicate the current resistance value in the measurement.

## 4. Pre-test preparation and instrument self-test

### 4.1 Pre-test preparation

#### 4.1.1 Test condition judgment:

- Before testing, please ensure that the field test conditions meet the test requirements, in order to ensure the normal test and the true accuracy of the test results.
- Measure the resistance  $R_{GE}$  of the water catchment to the base and the resistance  $R_{LG}$  of the winding to the water catchment with the resistor of the multimeter. Determine whether it meets the requirements of this type of instrument.
- Measuring the voltage between the water catchment pipe and the base with the multimeter "DC mV" gear should be less than 500 mV. The  $R_{GE}$  resistance value of the water catchment pipe to the seat should be  $> 3k$ .

#### 4.1.2 Instrument self-test:

- Check whether the power cord is connected properly. After the power is connected, the fan in the instrument begins to work. Turn on the high voltage in the open circuit state to check whether the output voltage is normal.

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- Test an analog resistor (such as a standard resistor) to check whether the voltage and resistance values are displayed properly; (No access to the catchment line)

## 4.2 Connection of power supply and test line

Connect 220V grid AC power supply (380V is strictly prohibited). When the power supply is inserted, the fan inside the instrument will start to turn, but the screen is not bright, indicating that the power supply has been connected and has electricity. Instrument measurement and other functions need to be selected by band switch to start.

Please use the special test line configured by the randomizer to connect the "L/G (winding)", "catchment pipe", "E (seat)" end of the instrument and the corresponding test points respectively. When the generator has multiple outlets of the catchment pipe, copper conductors with a cross-sectional area greater than 2.5mm are used to connect the outlets of the catchment pipe.

The direction of inserting red high voltage test line into instrument at line end should be consistent with the schematic diagram.

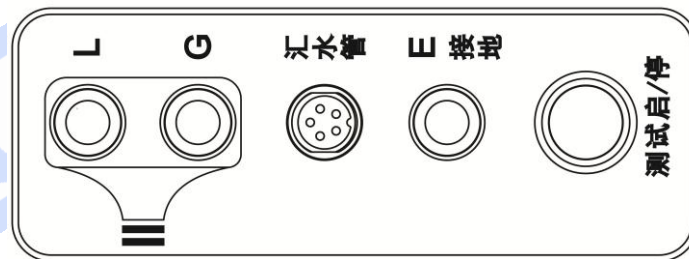


Figure 3 Instrument Terminal

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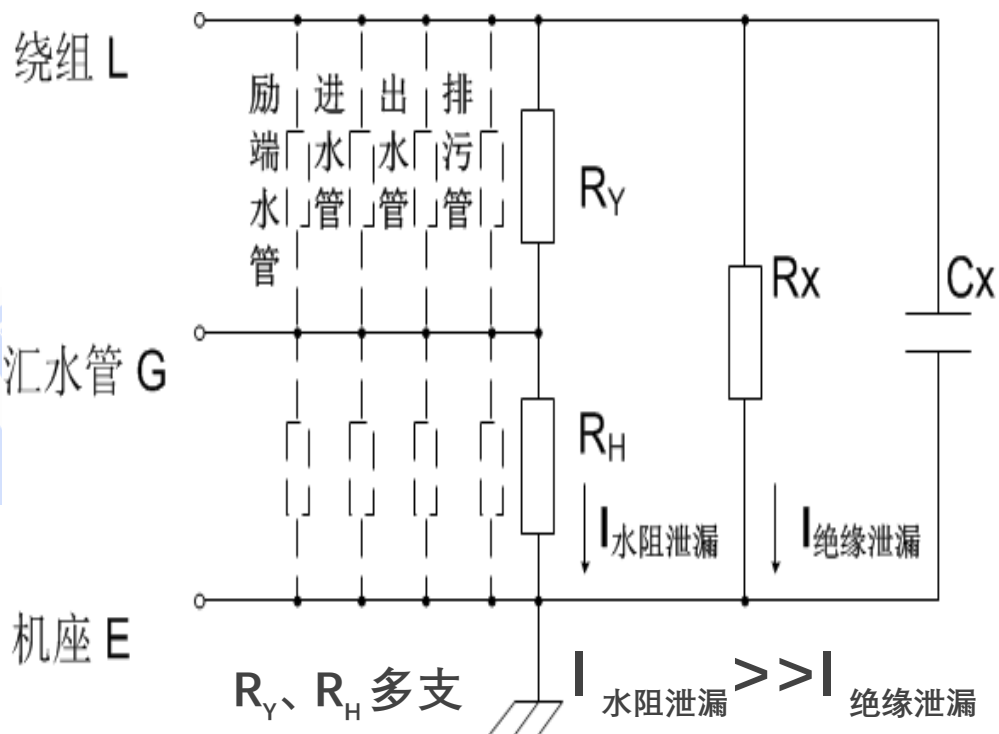


Fig. 4 Equivalent circuit diagram of instrument wiring and generator under test

## 5. Operation instructions

### 5.1 Boot up

After the connection between the power supply and the test line is correct, please rotate the function/voltage selector switch from the OFF gear to the appropriate rated voltage gear. At this time, the instrument screen will display the welcome interface as shown in Figure 5, and the instrument will begin to initialize. After initialization, it will jump to the measurement interface as shown in Figure 6.

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Figure 5 Initialization Welcome Interface

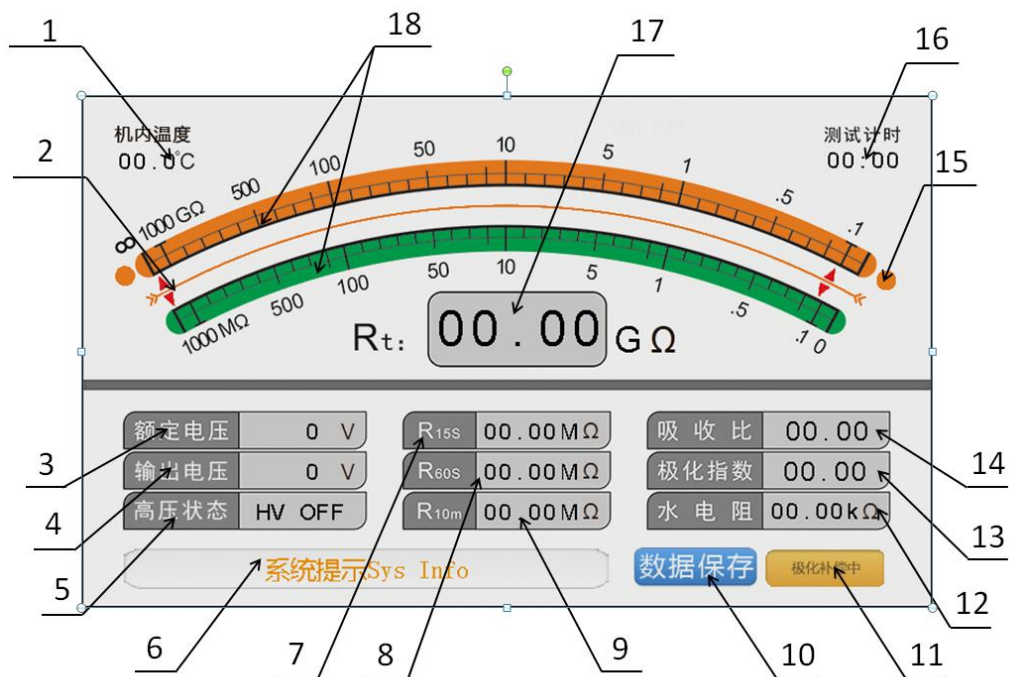


Figure 6 Measurement Interface

## 5.2 Insulation resistance measurement

After the initial welcome interface is finished, the tester will automatically enter the measurement interface.



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This instrument has the function of automatic polarization compensation. When it first enters the measurement interface, it will automatically carry out a polarization compensation. The instrument emits a "droplet" interval call reminder. The status reminder bar (6) on the LCD screen shows: "In polarization compensation, please wait..." At this time, please wait for the polarization compensation of the machine to be completed before operating.

When the polarization compensation is completed, the status prompt bar (6) will display the words "polarization compensation is over, high voltage test can be opened". At this time, the high voltage can be measured by pressing the "test start/stop" button.

To do the measurement, please click on the "test start/stop" button once. At this time, the high-pressure is turned on. The high-pressure state item on the measurement interface (5) shows the word "HV ON". The red LED light in the "test start/stop" button is on. At the same time, the buzzer in the machine indicates that the high-pressure has been turned on. The instrument begins to measure the resistance value.

At this time, a high voltage has been applied between the "L (winding)" terminal and the "E (seat)" terminal. Please pay attention to safety!

After the measurement starts, the rated voltage (3) shows the current selected voltage level, the output voltage (4) shows the current actual output voltage value, the  $R_t$  (17) shows the current real-time winding resistance value, and the water resistance (12) shows the current real-time water resistance value. When the measurement reaches 15 seconds, 60 seconds and 10 minutes, the measured resistance value at the corresponding time will be displayed to the corresponding position. At the same time, the absorption ratio will be calculated at 60 seconds to the absorption ratio display box (14), and at 10 minutes, the polarization

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index will be calculated to the polarization index display box (13).

At this time, if the measurement time is longer than 15 seconds, the machine will automatically record a set of measurement data into the data record. **The longest test time is about 10 minutes and 10 seconds.**

After the test is finished, press the "test start/stop" button to turn off the high voltage. After discharging the residual charge on the sample, the function switch is placed in the OFF bit and the power supply is turned off. Finally, remove the test line to avoid electric injury.

Do not change the function switch during the measurement, otherwise the high voltage will be turned off and the test will stop.

**Tips:** When the water resistance is too low and the load is too heavy, the output high voltage will automatically decrease, which will affect the test accuracy. In order to ensure the test accuracy, the water conductivity should be reduced and the water resistance should be increased before the test.

## 5.3 System Setup and Data Query

When the high voltage is not started, the instrument can query the equipment and data.

### 5.3.1 Time setting

Rotate the function/voltage selector switch to the system settings file to enter the system settings interface. The interface layout is shown in Figure 7.

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Figure 7 System Settings Menu

Click the **Time setting** option to enter the time setting interface, as shown in Figure 8.

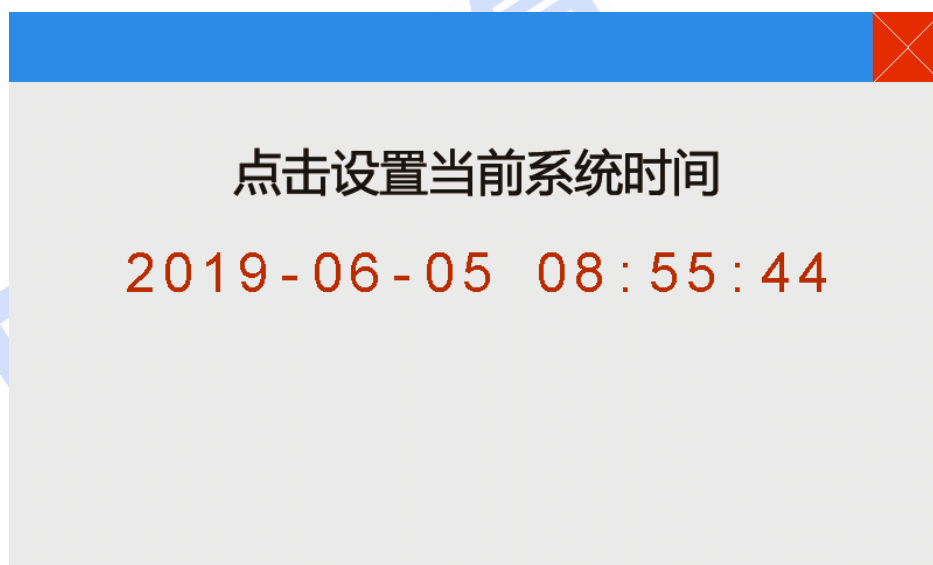


Figure 8 Time Setup Interface

In the time setting interface, clicking on the red time font of the interface will pop up the setting keyboard. After entering the correct time and date, click the return button to save. Be sure to set the correct time and date, otherwise the current measurement time will not be recorded

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correctly. When all settings are completed, you can click the top right button to return to the previous menu, or turn the function/voltage selector switch to the measurement file and return to the measurement interface.

### 5.3.2 Data query

Click on the **Data query** option to enter the data query interface, as shown in Figure 9.



2019-06-05 09:00:30		总数:	
测量时间: 2019/03/24 12:23		20	
档 位: 2500V	测量时长: 10:11	当前: 1	
R15s : 18.00MΩ	吸收比 : 1.11	上一页	
R60s : 20.00MΩ	极化指数 : 1.05	下一页	
R10m : 21.00MΩ	水电阻 : 62.34KΩ	清空所有记录	

Figure 9 Data Query Interface

This interface can query the measurement data saved in previous measurements. All data are sorted according to the storage time, first before and then after. Clicking the top and bottom page flip button in the lower right corner can jump in different records. If you want to clear all measurements currently saved, click the Clean All Records button in the lower right corner, and the Clean Confirmation Interface will pop up, as shown in Figure 10. Click Yes to empty all stored measurements.

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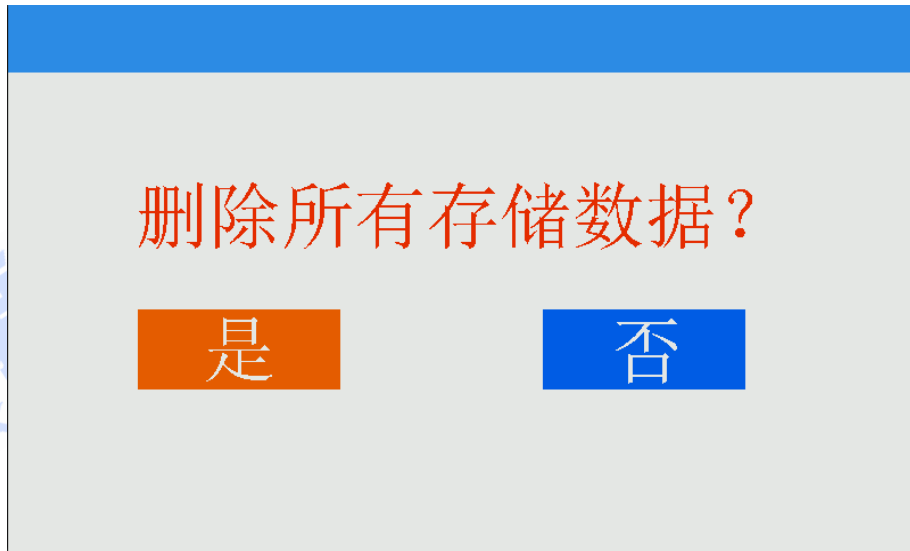


Figure 10 Cleaning Confirmation Interface

## 6. Change Fuse



Figure 1



Figure 2

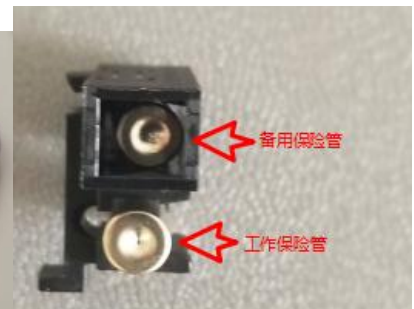


Figure 3

The fuse is located at the outlet of the power supply. Use the tool to pry it up at the arrow in Figure 1. Open the fuse box and replace the fuse.



## 7. List of product accessories

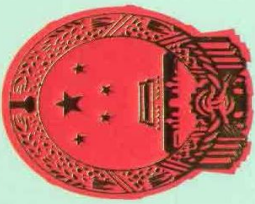
No.	Name	quantity
1	"L, G" (Winding) Double Plug with Shielded High Voltage Connecting Wire (Red)	1
2	"E Ground" Base Connection (Black)	1
3	Special water collecting pipe connection (black)	1
4	AC 220V power cord	1
5	Multifunctional connector	
6	Spare fuse	1
7	Standard resistance	1
8	Aluminum alloy outer box	1
9	Instructions	1
10	Certificate	1



## 8. Common problems and explanation


<b>Common phenomenon</b>	<b>Description and disposal</b>
There is no display on the screen after booting.	Check whether 220V AC power supply is reliably connected.
There is no test data.	There may be poor contact between the test line and the tested product, and the wiring sequence and direction may be wrong.
	Press the test switch button to display HV ON on the high-voltage status bar on the display screen.
	The insulation resistance value of the tested product exceeds the upper limit of the instrument range or open circuit.
The output voltage can not reach the rated value.	The resistance value of the tested product is too small to pull down the output voltage.
	The water resistance of the winding to the catchment pipe is too low. It should be noted that the 2500V gear should be greater than 20K and the 5000V gear should be greater than 30K.
	The internal resistance of the voltmeter used for calibration is too low. The voltage level of insulation characteristic tester is 2500V and 5000V. The internal resistance of the calibrated voltmeter should be higher than 1GΩ.
When you save the data, you are prompted that the data is full.	The internal storage space is full. Please try again after clearing the data in the data query interface.

## 9. Type approval certificate of measuring instruments


		经批准的计量器具新产品（名称、型号）： 绝缘特性测试仪	
		规格 2500V (0~10) GΩ	准确度 10级
序号 1	型号 KD2678	(以下空白)	


**中华人民共和国**  
**计量器具型式批准证书**  
**武汉市康达电气有限公司**

根据中华人民共和国计量法第十三条和中华人民共和国计量法实施细则有关规定，对你单位申请型式批准的计量器具新产品经审查合格，现予批准，并可使用以下标志和编号：



12E043-42



批准人： 



发证日期：2012年7月15日  
 发证机关（盖章）：

## Instruments manufactured by our company

<p><b>Insulation class:</b></p> <p><b>KD2676E</b> (Pointer type) Insulated Resistor Meter 5kV/10kV/ 1T Ω</p> <p><b>KD2676F</b> (Pointer type) Insulated Resistor Meter 2.5kV/5 kV/ 500G Ω</p> <p>➤<b>KD2676G</b> (Pointer type) Insulated Resistor Meter 0.5kV/1 kV /2.5 kV / 40G Ω</p> <p>➤<b>KD2671A</b> (Digital Display) Insulated Resistor Meter 250V/500V/1000V/2500 200G Ω</p> <p>➤<b>KD2671B</b> (Digital Display) Insulated Resistor Meter 500V/1000V/2500/5000V 500G Ω</p> <p>➤<b>KD2677C1</b> (Digital Display) Insulation Resistance Tester 0.5kV/1 kV /2.5 kV/5 kV / 500 Ω</p>	<p><b>Grounding and Lightning Protection:</b></p> <p>KD2571B2 Grounding Resistor Meter</p> <p>KD2571BV Grounding resistance tester</p> <p>KD2571P1 Grounding Resistor Meter</p> <p>KD2571C1 Large scale grounding resistance tester</p> <p>KD2531T2 Equipotential connection conduction tester</p> <p>KD2531E Ground network conduction tester</p> <p>FC-2G Lightning Protection Component Tester</p> <p>KDFC-2GH1 Multifunctional portable lightning protection component tester</p>
<p>➤<b>KD2677C</b> (Digital Display) Insulation Resistance Tester 0.5kV/1 kV /2.5 kV/5 kV / 2T Ω</p> <p>➤ <b>KD2677E</b> (Double Explicit) Insulation Characteristic Tester 5 kV /10kV / 2T Ω</p> <p>➤<b>KD2677F</b> (Double Explicit) Insulation Characteristic Tester 2.5kV/5 kV / 1T Ω</p> <p>➤<b>KD2677G</b> (Double Explicit) Insulation Characteristic Tester 0.5kV/1 kV /2.5 kV/5 kV / 1T Ω</p> <p>➤<b>KD2677HV-5/-10</b> Insulation Characteristic Tester with Strong Anti-interference</p>	<p>KDFC-2Gh SPDComprehensive Tester (Four in One Test)</p> <p><b>Special instrument:</b></p> <p>Large Ground Grid Grounding Parameter Testing System</p> <p>KD2571D Large Ground Network Grounding Impedance Tester</p> <p>KD2293 Ground Network Voltage Tester</p> <p>KD2571-FL Ground network shunt vector tester</p> <p><b>Insulation Characteristic Testing Instrument for Water-cooled Generator</b></p> <p>KDDQ2678A 2.5kV/ 20G Ω</p> <p>KDDQ2678B 5kV / 20G Ω</p> <p>KDDQ2678C 2.5kV/ 5kV / 50G Ω</p> <p>KDDQ2678C 2.5kV/ 5kV / 50G Ω</p> <p><b>KD2677HV Insulation Resistance Testing Equipment under Strong Induction</b></p> <p><b>KDSJ Verification Platform of Insulation</b></p>

	<p>Resistance Tester for Water-cooled Generator</p> <p>KDJF Verification Platform of Lightning Protection Component Tester</p> <p>KDVI Calibration System of Grounding Power Frequency Characteristic Parameter Tester</p>
 <p>鄂制01000177号</p>	







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