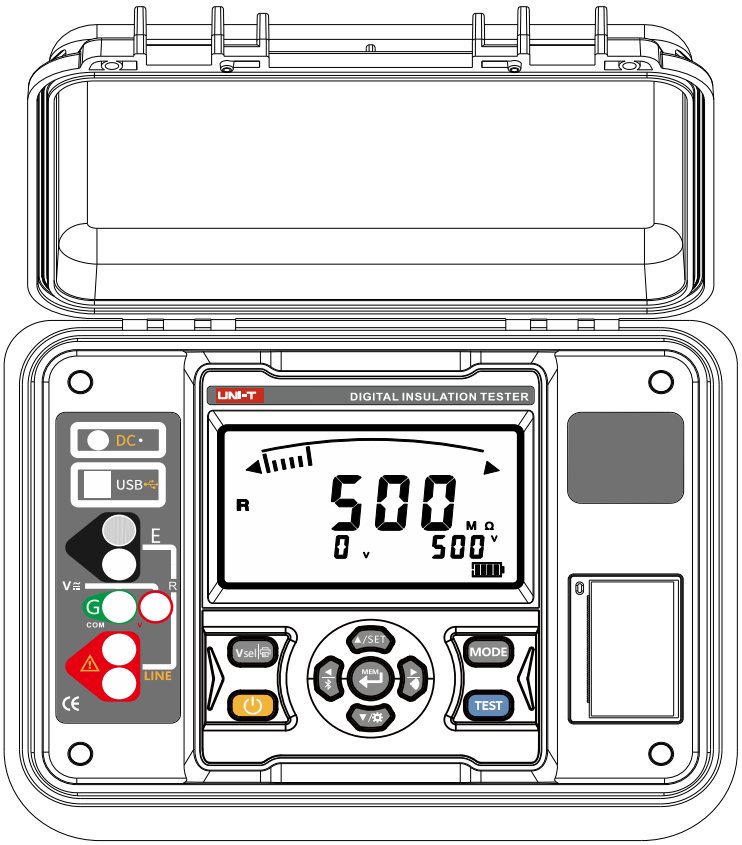
UNI-T®




# UT513G
# UT515A+
# UT516E

## 使用手册
## Operating Manual

兆欧表

# 目录

# 一、 安全规则及注意事项

感谢您购买了本公司**兆欧表**，在你初次使用该仪器前，为避免发生可能的触电或人身伤害，请一定：**详细阅读并严格遵守本手册所列出的安全规则及注意事项。**任何情况下，使用本仪表应特别注意安全。

- ✧ 本仪表根据 IEC61010 安全规格进行设计、生产、检验。
- ✧ 任何情况下，使用本仪表应特别注意安全。
- ✧ 测量时，移动电话等高频信号发生器请勿在仪表旁使用，以免引起误差。
- ✧ 注意本仪表机身的标贴文字及符号。
- ✧ 使用前应确认仪表及附件完好，仪表、测试线绝缘层无破损、无裸露、无断线才能使用。
- ✧ 测量过程中，严禁接触裸露导体及正在测量的回路。
- ✧ 确认导线的连接插头已紧密地插入仪表接口内。
- ✧ 请勿在易燃性场所测量，火花可能引起爆炸。
- ✧ 仪表在使用中，机壳或测试线发生断裂而造成金属外露时，请停止使用。
- ✧ 请勿于高温潮湿，有结露的场所及日光直射下长时间放置和存放仪表。
- ✧ 给仪表更换电池时，请确认测试线已移离仪表，仪表处于关机状态。
- ✧ 仪表显示电池电压低符号“▭”，应及时充电，否则会引起误差。
- ✧ **测量过程中严禁进行充电或者进行数据传输操作。**
- ✧ 注意本仪表所规定的测量范围及使用环境。
- ✧ 使用、拆卸、校准、维修本仪表，必须由有授权资格的人员操作。
- ✧ 由于本仪表原因，继续使用会带来危险时，应立即停止使用，并马上封存，由有授权资格的机构处理。
- ✧ 仪表及手册中的“⚠”安全警告标志，使用者必须严格依照本手册内容进行安全操作。
- ✧ 仪表输出高压，请务必连接好测试线手离开测试线后才按测试键进行测试，否则有触电危险。
- ✧ 测试完成后，先等待一分钟放电完成后再移除测试线，移除测试线时先移除仪表端的测试线再把测试线收好。

# 二、 简介

**UT515 系列兆欧表**又名**绝缘电阻测试仪、高压绝缘电阻测试仪**等，用于绝缘电阻的测试。本仪表具有 LCD 大屏幕灰白背光显示、数据存储、数据查阅、报警、自动关机等功能。同时还具备测量直流电压、交流电压、吸收比和极化指数功能。整机美观高档，量程宽广，分辨率高，操作便捷，携带方便，准确、可靠、性能稳定，抗干扰能力强。而且具有防震、防尘、防潮结构，是电信、电力、气象、机房、油田、机电安装和维修以及利用电力作为工业动力或能源的工业企业部门常用而必不可少的仪表。它适用于测量各种绝缘材料的电阻值及变压器、电机、电缆及电器设备等的绝缘电阻。

兆欧表由中大规模集成电路组成。本表输出功率大，输出电压等级多（有 6 个电压等级）。直流电压测量范围 0～1000V, 交流电压测量范围 0～750V。

# 三、 量程及精度

## 3.1、 绝缘电阻量程及精度

| 测量功能 | 输出电压 | 测量范围 | 精度 | 分辨率 |
|---|---|---|---|---|
| 绝缘电阻 | 100V(+20%) | 0.05MΩ～0.5MΩ | ±3%rdg±5dgt | 0.001MΩ |
| | | 0.5MΩ～5MΩ | ±3%rdg±5dgt | 0.01MΩ |
| | | 5MΩ～50MΩ | ±3%rdg±5dgt | 0.1MΩ |
| | | 50MΩ～500MΩ | ±3%rdg±5dgt | 1MΩ |
| | | 0.5GΩ～5GΩ | ±5%rdg±5dgt | 0.01GΩ |
| | | 5GΩ～50GΩ | ±10%rdg±5dgt | 0.1GΩ |
| | | 50GΩ～500GΩ | ±20%rdg±5dgt | 1GΩ |
| | 250V(+20%) | 0.1 MΩ～1MΩ | ±3%rdg±5dgt | 0.001MΩ |
| | | 1 MΩ～10MΩ | ±3%rdg±5dgt | 0.01MΩ |
| | | 10 MΩ～100MΩ | ±3%rdg±5dgt | 0.1MΩ |
| | | 100MΩ～1000MΩ | ±3%rdg±5dgt | 1MΩ |
| | | 1GΩ～10GΩ | ±5%rdg±5dgt | 0.01GΩ |
| | | 10GΩ～100GΩ | ±10%rdg±5dgt | 0.1GΩ |
| | | 100GΩ～1000GΩ | ±20%rdg±5dgt | 1GΩ |
| | 500V(+20%) | 0.2 MΩ～2MΩ | ±3%rdg±5dgt | 0.001MΩ |
| | | 2 MΩ～20MΩ | ±3%rdg±5dgt | 0.01MΩ |
| | | 20 MΩ～200MΩ | ±3%rdg±5dgt | 0.1MΩ |
| | | 200 MΩ～2000MΩ | ±3%rdg±5dgt | 1MΩ |
| | | 2GΩ～20GΩ | ±5%rdg±5dgt | 0.01GΩ |
| | | 20GΩ～200GΩ | ±10%rdg±5dgt | 0.1GΩ |
| | | 200GΩ～2000GΩ | ±20%rdg±5dgt | 1GΩ |

| | | | | |
|---|---|---|---|---|
| | 1000V(+20%) | 0.5 MΩ～5MΩ | ±3%rdg±5dgt | 0.001MΩ |
| | | 5 MΩ～50MΩ | ±3%rdg±5dgt | 0.01MΩ |
| | | 50 MΩ～500MΩ | ±3%rdg±5dgt | 0.1MΩ |
| | | 500 MΩ～5000MΩ | ±3%rdg±5dgt | 1MΩ |
| | | 5GΩ～50GΩ | ±5%rdg±5dgt | 0.01GΩ |
| | | 50GΩ～500GΩ | ±10%rdg±5dgt | 0.1GΩ |
| | | 500GΩ～5000GΩ | ±20%rdg±5dgt | 1GΩ |
| | 2500V(+20%) | 1 MΩ～10MΩ | ±3%rdg±5dgt | 0.01MΩ |
| | | 10 MΩ～100MΩ | ±3%rdg±5dgt | 0.1MΩ |
| | | 100 MΩ～1000MΩ | ±3%rdg±5dgt | 1MΩ |
| | | 1 GΩ～10GΩ | ±3%rdg±5dgt | 0.01GΩ |
| | | 10 GΩ～100GΩ | ±5%rdg±5dgt | 0.1GΩ |
| | | 100 GΩ～1000GΩ | ±10%rdg±5dgt | 1GΩ |
| | | 1 TΩ～10TΩ | ±20%rdg±10dgt | 0.01TΩ |
| | 5000V(+20%) | 2 MΩ～20MΩ | ±3%rdg±5dgt | 0.01MΩ |
| | | 20 MΩ～200MΩ | ±3%rdg±5dgt | 0.1MΩ |
| | | 200 MΩ～2000MΩ | ±3%rdg±5dgt | 1MΩ |
| | | 2 GΩ～20GΩ | ±3%rdg±5dgt | 0.01GΩ |
| | | 20 GΩ～200GΩ | ±5%rdg±5dgt | 0.1GΩ |
| | | 200 GΩ～2000GΩ | ±10%rdg±5dgt | 1GΩ |
| | | 2 TΩ～10TΩ | ±20%rdg±10dgt | 0.01TΩ |
| | 10kV(+20%) | 5 MΩ～50MΩ | ±3%rdg±5dgt | 0.01MΩ |
| | | 50 MΩ～500MΩ | ±3%rdg±5dgt | 0.1MΩ |
| | | 500 MΩ～5000MΩ | ±3%rdg±5dgt | 1MΩ |
| | | 5 GΩ～50GΩ | ±5%rdg±5dgt | 0.01GΩ |
| | | 50 GΩ～500GΩ | ±10%rdg±5dgt | 0.1GΩ |
| | | 500 GΩ～5000GΩ | ±20%rdg±5dgt | 1GΩ |
| | | 5TΩ～35TΩ | ±30%rdg±10dgt | 0.01TΩ |
| | 15kV(+20%) | 6 MΩ～60MΩ | ±3%rdg±5dgt | 0.01MΩ |
| | | 60 MΩ～600MΩ | ±3%rdg±5dgt | 0.1MΩ |
| | | 600 MΩ～6000MΩ | ±3%rdg±5dgt | 1MΩ |
| | | 6 GΩ～60GΩ | ±5%rdg±5dgt | 0.01GΩ |
| | | 60 GΩ～600GΩ | ±10%rdg±5dgt | 0.1GΩ |
| | | 600 GΩ～6000GΩ | ±20%rdg±5dgt | 1GΩ |
| | | 6 TΩ～50TΩ | ±30%rdg±10dgt | 0.01TΩ |

温度特性：使用温度范围内加上测试精度×0.2/℃。(18℃到 28℃以外)计算方法：精度 =（当前档位精度）+ 0.2×(温差数)×（当前档位精度）举例：使用环境 8℃/10kV 第 1 档 该档精度为±3%rdg±5dgt 精度 =（±3%rdg±5dgt）+ 0.2×10×(±3%rdg±5dgt) =9%rdg±15dgt。

**注意：1、每个电压档的最小两个量程段存在电阻越小电压跌落越大的情况，属于正常现象。**

**2、每个电压档最后两个量程段测试时间大于 100s。**

**注：常用电气单位换算**

1 TΩ（Tera ohm）=1000GΩ=$10^{12}$Ω　　1 GΩ（Giga ohm）=1000MΩ=$10^{9}$Ω

1MΩ（Mega ohm）=1000KΩ=$10^{6}$Ω

### 3.2、 电压量程及精度

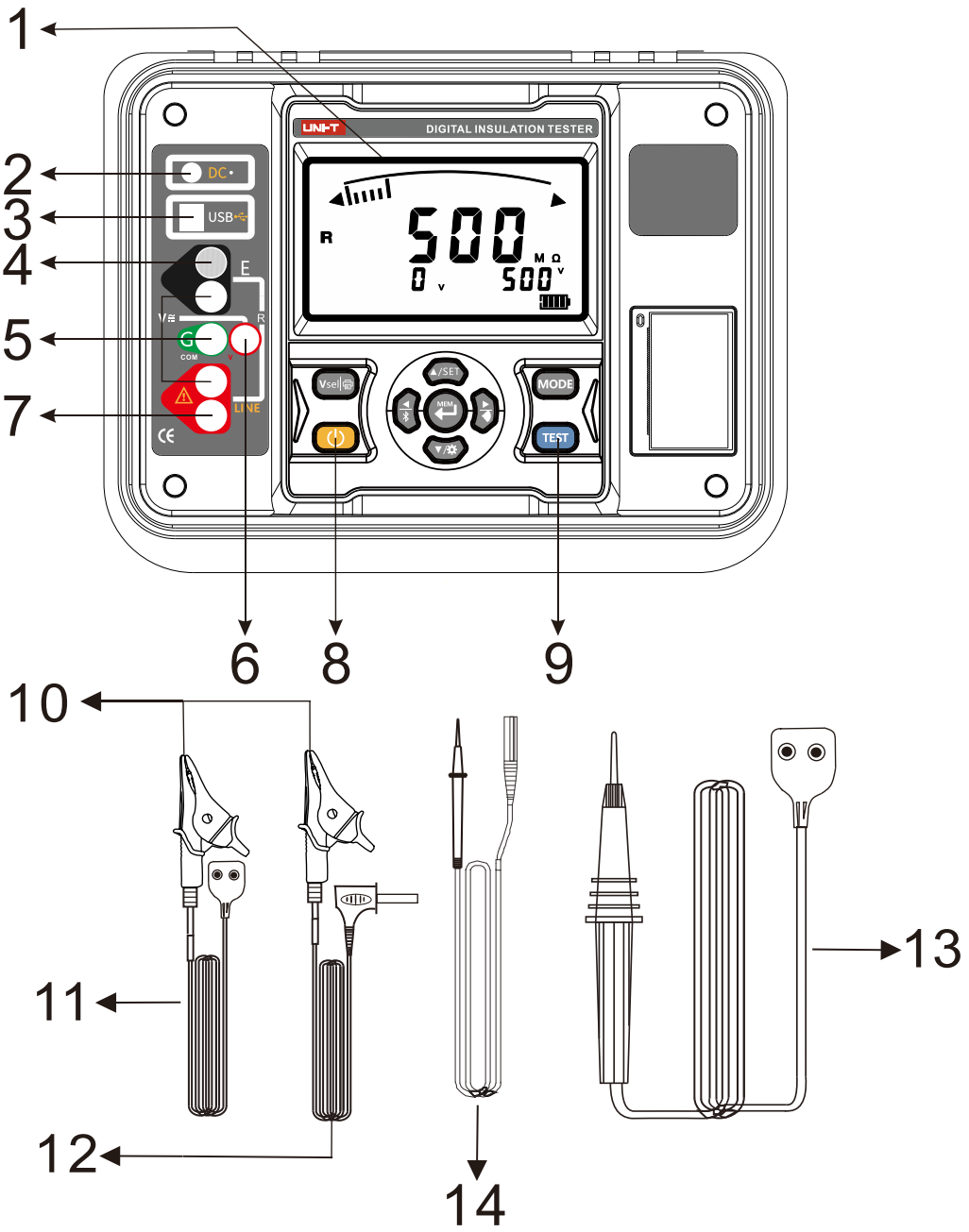
| 测量功能 | 测量范围 | 精度 | 分辨率 |
|---|---|---|---|
| 直流电压 | DC 0.0V～1000V | ±1.5%rdg±3dgt | 0.1V |
| 交流电压 | AC 0.0V～750V | ±1.5%rdg±3dgt | 0.1V |

# 四、 技术规格

| | | | |
|---|---|---|---|
| 功能 | | 绝缘电阻测试，电压测试 | |
| 基准条件 | | 23℃±5℃，75%rh 以下 | |
| UT513G | 额定电压 | 100V、250V、500V、1000V、2500V、5000V | |
| | 绝缘电阻量程 | 0.05MΩ～10TΩ | 分辨率：0.001MΩ |
| UT515A+ | 额定电压 | 250V、500V、1000V、2500V、5000V、10kV | |
| | 绝缘电阻量程 | 0.1MΩ～35TΩ | 分辨率：0.001MΩ |
| UT516E | 额定电压 | 500V、1000V、2500V、5000V、10kV、15kV | |
| | 绝缘电阻量程 | 0.2MΩ～50TΩ | 分辨率：0.001MΩ |
| 测量电压(V) | | 额定电压×（1+20%） | |
| 直流电压量程 | | 0～1000V | 分辨率：0.1V |
| 交流电压量程 | | 0～750V | 分辨率：0.1V |
| 输出短路电流 | | ≥6mA | |
| 吸收比和极化指数测量 | | 有 | |
| 放电功能 | | 有 | |
| 电源 | | 10.95V 充电锂电池 | |
| 背光 | | 可控灰白屏背光，适合昏暗场所使用 | |
| 显示模式 | | 4 位超大 LCD 显示，灰白屏背光 | |
| LCD 显示尺寸 | | 153.8mm×85.6mm | |
| 仪表尺寸 | | 长宽高：380mm×310mm×153mm | |
| USB 接口 | | 具有 USB 接口，软件监控，存储数据可以上传电脑， | |

| | |
|---|---|
| | 保存打印 |
| **手机 APP** | 有，蓝牙连接，软件监控，存储数据可以上传电脑，保存打印 |
| **通 讯 线** | USB 通讯线 1 条 |
| **测试线** | 高压棒红色 3 米，黑色电阻测试输入线 3 米，红色线 1.5 米，绿线 3 米 |
| **数据存储** | 300 组，闪烁显示“FULL”符号表示存储已满 |
| **数据查阅** | 数据查阅功能：“MR”符号显示 |
| **溢出显示** | 超量程溢出功能：“>”符号显示 |
| **报警功能** | 有 |
| **数据打印** | 有 |
| **功耗** | 待机：80mA Max(背光关闭)，开机开背光：90mA Max<br>测量：2.1A Max(背光关闭) |
| **仪表质量** | 4.10kg(含电池) |
| **电池电压** | 电池电压不足，显示低电符号“▭” |
| **自动关机** | 仪表无操作 15 分钟关机 |
| **绝缘电阻** | ≥50MΩ(测量线路与外壳间) |
| **耐压** | AC3kV/50Hz 1min |
| **工作温度和湿度** | －10℃～+50℃＜85%RH |
| **贮存温度和湿度** | －15℃～+55℃＜90%RH |
| **适合安规** | IEC61010-1 、 IEC1010-2-31 、 IEC61557-1,5 、<br>IEC60529(IP54)、污染等级 2、CAT Ⅲ 300V |

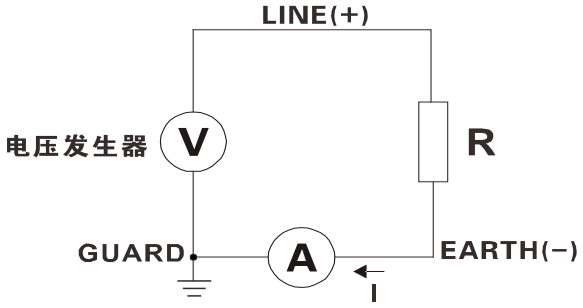
# 五、 仪表结构




1. LCD 显示屏
2. 充电接口
3. USB 接口
4. EARTH 接口
5. GUARD 接口
6. V 接口
7. LINE 接口
8. 开关机键
9. 测试键
10. 安全海豚夹
11. EARTH 接口测试线
12. 测试线（绿）
13. 高压测试端香蕉插头插 LINE 接口
14. 电压测试表笔（红）

# 六、 测量原理

绝缘电阻测量采用电压发生器产生一个电压 V，施加到电阻两端，通过测量在电阻两端流动电流 I，并根据公式 R=V/I 计算绝缘电阻值 R。




$$R = V / I$$

# 七、 操作方法

## 7.1、 开关机

按 POWER 键实现开关机。开机后右下角显示“APO”，不操作时 15 分钟后自动关机。

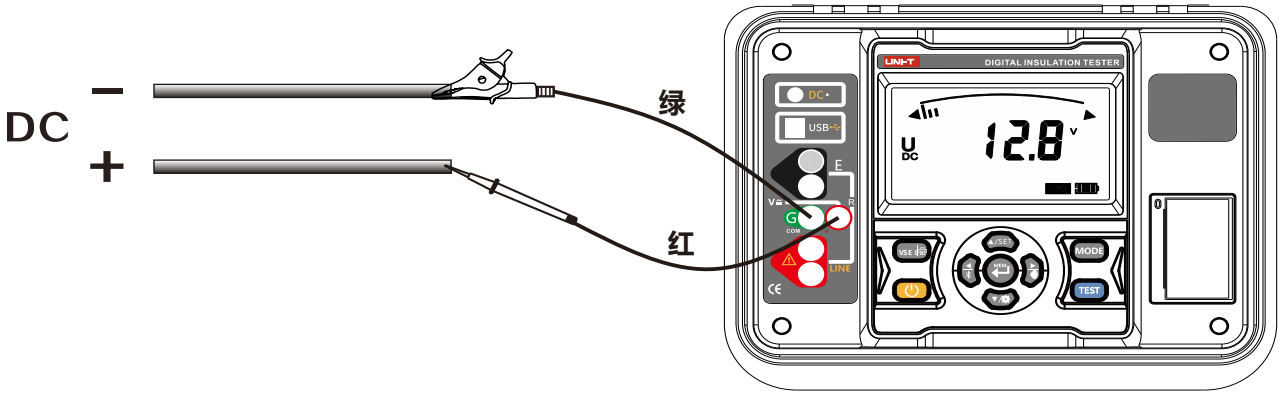
## 7.2、 电池电压检查

开机后，如果 LCD 显示电池电压低符号“▭”，表示电池电量不足，请及时充电。电池电力充足才能保证测量的精度。

## 7.3、 直流电压测试

| | |
|---|---|
| ⚠ | **输入仪表直流电压不能超过 1000V。** |

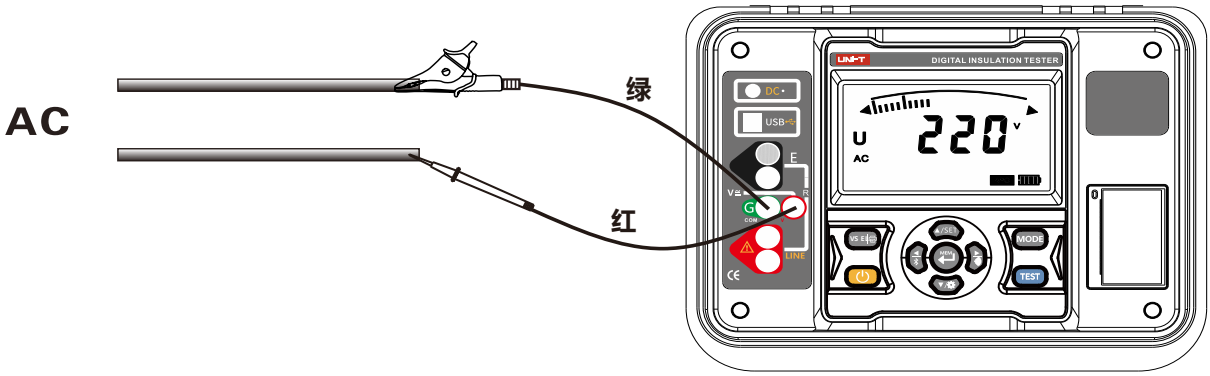
测量时短按“MODE”切换到直流电压测试模式，将红表笔与 V 端端子相连，绿测试线与 COM 相连，LCD 显示实时直流电压值，长按“Vsel”键可以打印当前测量电压。



## 7.4、 交流电压测试

| | |
|---|---|
| ⚠ | **输入仪表交流电压不能超过 750V。** |

测量时短按“MODE”按键切换到交流电压测试模式，将红表笔与 V 端端子相连，绿测试线与 COM 相连，LCD 显示实时交流电压值，长按“Vsel”键可以打印当前测量电压。




## 7.5、 绝缘电阻测试

| | |
|---|---|
| ⚠ | **绝缘电阻测试只能在不带电的电路上进行，测试前请检查测试线路导线是否完好，及被测电路是否带电，线路带电可能会损坏仪表并且影响测量精度。** |
| | **必须戴上高压绝缘手套操作。** |
| | **绝缘电阻量程时，按测试开关后测试线头部和被测回路中产生高压，请注意避免触摸。** |
| | **请务必将接地线（黑色）连接被测回路的接地端口。** |
| | **测试以后请勿立刻触摸电路。存储的电荷可能导致触电事故。** |
| | **请勿立刻取下测试线，必须等放电完成后再碰触被测回路。** |
| | **为了保证测量精度测试时不要把测试线缠绕在一起。** |

## 1、 测试高压绝缘电阻注意事项:

| | |
|---|---|
|  | 高压绝缘材料阻值越大，加上直流电压后通过它的电流越小，极易受到外界环境干扰的影响，造成较大的测试误差。 |
| | 被测电阻值越高，测量时间则越长。 |
| | 湿度增加，表面泄漏增大，体电导电流也会增加。 |
| | 一般材料的电阻值随环境温湿度的升高而减小。 |

## 2、 保证绝缘电阻精度的温湿度值

| 绝缘电阻范围 | 保证绝缘电阻精度的湿度值 | 保证绝缘电阻精度的温度值 |
|---|---|---|
| 0Ω-100MΩ | <85% RH(无凝露) | 23℃±5℃ |
| 100MΩ-20GΩ | <75% RH(无凝露) | |
| 20GΩ-200GΩ | <65% RH(无凝露) | |
| 200GΩ-1TΩ | <55% RH(无凝露) | |
| 1TΩ-10TΩ | <45% RH(无凝露) | |
| 10TΩ-50TΩ | <35% RH(无凝露) | |

## 3、绝缘电阻测试操作

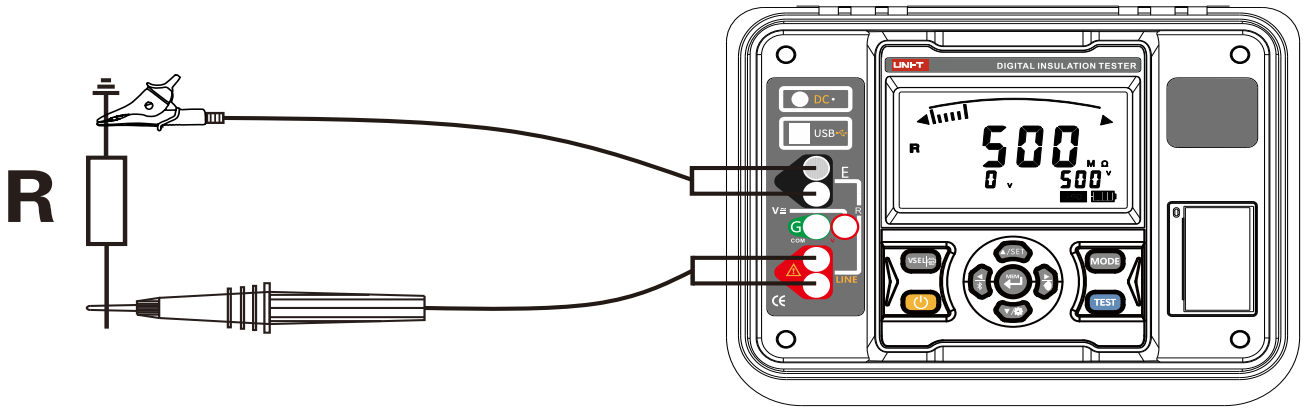
1、绝缘电阻测试只能在不带电的电路上进行，测试前应检查测试导线是否良好，确认被测回路是否带电。(测试大容量产品（电缆、大容量变压器等）时，请长按测试键 3 秒，进入标准测试模式。此时屏幕显示“NOISE”符号)

2、短按“ 

”按键切换到测电阻模式，然后短按“ 

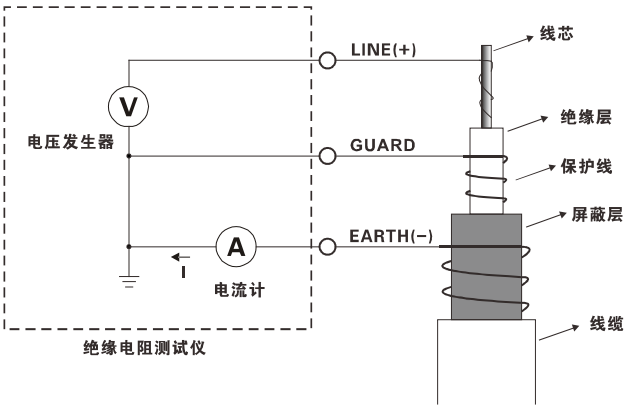
”键切换到要进行测试的电压值。

3、接地线(黑)一端连接仪表连接 EARTH 端另一端连接被测回路接地端。高压棒测试线(红)一端连接仪表 LINE 端另一端头部接触被测电路，如图，短按“TEST”测试键开始测试(测试时仪表会发出间歇性蜂鸣：“滴~滴~滴...”的提示)。待测量完成显示值固定不变后方可读取绝缘电阻值，长按“Vsel”键可以打印当前测量到的绝缘电阻值。




## 7.6、 GUARD 保护线的使用

测量电缆的绝缘电阻时，覆盖表面的泄漏电流通过绝缘体内部与电流汇合，造成绝缘电阻值误差的产生。为避免此种现象的发生，如下图所示，使用保护线（任何导电性裸线）将泄漏电流流经部分卷起来，连接到保护端口后，泄漏电流不流过指示计，可准确测量绝缘体的绝缘电阻。请使用附件的保护测试线连接保护端口。




## 7.7、 极化指数（PI）和吸收比（DAR）滤波测试

### 1、极化指数（PI）和吸收比（DAR）作用：

极化指数（PI）和吸收比（DAR）是检查绝缘体的泄漏电流的时间是否增加的试验。确认施加时间的同时泄漏电流没有增加。仪表自动计算极化指数 PI 和吸收比 DAR 值，作为判断绝缘性能的依据，极化指数 PI 和吸收比 DAR 都表示被测物承受测量电压后一段时间内绝缘电阻的变化情况。

## 2、极化指数（PI）和吸收比（DAR）区别：

对于一般的绝缘体测试，如外壳绝缘、工具手柄等一般在较短时间能测试出随施加电压时间增加漏电流是否增加情况，所以一般用较短时间的试验就能测试出来，短时间测试的绝缘电阻比值 DAR 称为吸收比（具体测试时间见下面公式），但对于大容量和吸收过程较长的被测品，如变压器、发电机、电缆、电容器等电气设备，有时吸收比值(DAR)尚不足以反映吸收的全过程，可采用较长时间的绝缘电阻比值，即 10 分钟时的绝缘电阻(R10min)与 l 分钟时的绝缘电阻(R1min)的比值 PI 来描述绝缘吸收的全过程，PI 称为极化指数。

PI 和 DAR 值通过下面的公式计算：

PI(极化指数)= $\dfrac{R10Min}{R1Min}$

DAR（吸收比）= $\dfrac{R60Sec}{R15Sec}$

DAR（吸收比）= $\dfrac{R60Sec}{R30Sec}$

**注：** 1：R10Min=电压施加 10 分钟测量的电阻值

2：R1Min=R60Sec=电压施加 1 分钟测量的电阻值

3：R30Sec=电压施加 30 秒测量的电阻值

4：R15Sec=电压施加 15 秒测量的电阻值

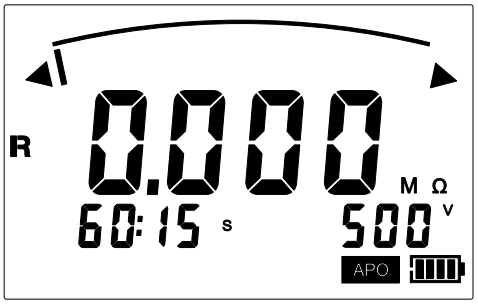
5：DAR 的计算时间可以选择 15 秒或 30 秒。

## 3、极化指数（PI）和吸收比（DAR）测试

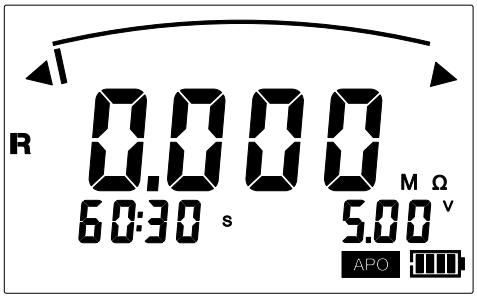
1、极化指数（PI）和吸收比测试(DAR)只能在不带电的电路上进行，测试前应检查测试导线是否良好，确认被测回路是否带电。

2、短按“MODE”按键切换到测电阻模式，然后短按“Vsel”键切换到要进行测试的电压值。

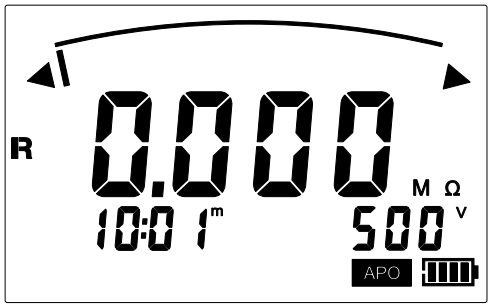
3、长按“MODE”键选择相应模式，LCD 左下角显示“10:01m”为极化指数模式，显示“60:15S”为吸收比模式 15 秒模式，显示“60:30S”为吸收比模式 30 秒模式，LCD 左下角不显示任何东西的为绝缘电阻测量模式。



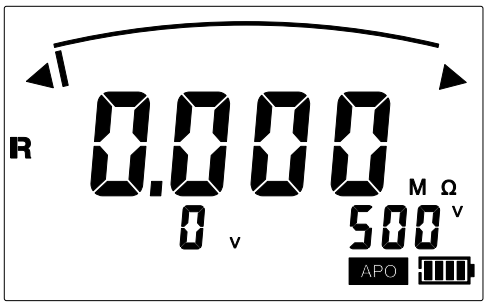

吸收比模式 15 秒模式




吸收比模式 30 秒模式




极化指数模式

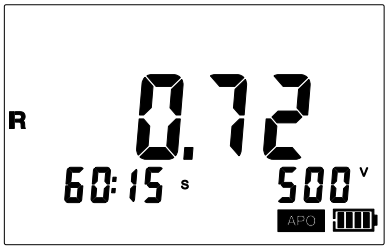



绝缘电阻测量模式

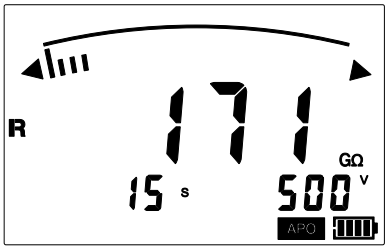
4、接地线(黑)一端连接仪表连接 EARTH 端另一端连接被测回路接地端。高压棒测试线(红)一端连接仪表 LINE 端另一端头部接触被测电路，短按“TEST”测试键开始测试，待测量完成显示值固定不变后方可读取吸收比或者极化指数值。

5、待测试完成后可按“▲/SET”键切换查看吸收比或者极化指数值的被除数、比值，或按“▼/☼”键切换查看吸收比或者极化指数值的比值、除数（比如“60:15S”模式下，左下角显示“60:15S”则为比值，显示”15S”则为除数，显示“60S”则为被除数，其他模式相同）。

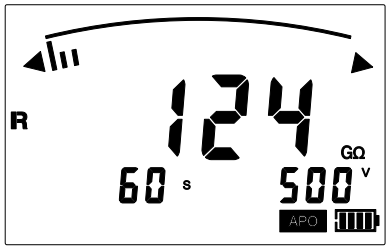
6、长按“Vsel”键可以打印当前测量到的“比值”、“除数”、“被除数”




比值




除数

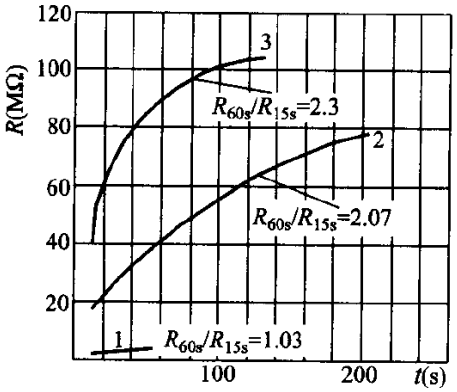



被除数

**4、极化指数（PI）和吸收比（DAR）应用：**

在工程上，绝缘电阻和吸收比(或极化指数)能反映发电机、油浸式电力变压器等设备绝缘的受潮程度。绝缘受潮后吸收比(或极化指数)值降低(如图 1)，因此它是判断绝缘是否受潮的一个重要指标。

应该指出，有时绝缘具有较明显的缺陷(例如绝缘在高压下击穿)，吸收比或极化指数值仍然很好。吸收比或极化指数不能用来发现受潮、脏污以外的其他局部绝缘缺陷。




1—干燥前 15℃；2—干燥结束时 73.5℃；3—运行 72h 后，并冷却至 27℃

**图 1　某台发电机绝缘电阻 $R$ 与时间 $t$ 的关系**

**极化指数参考判定值：**

| 极化指数 | 4以上 | 4～2 | 2.0～1.0 | 1.0以下 |
|---|---|---|---|---|
| 判定 | 最好 | 良好 | 要注意 | 不良 |

**吸收比参考判定值：**

| 吸收比 | 1.4以上 | 1.25～1.0 | 1.0以下 |
|---|---|---|---|
| 判定 | 最好 | 良好 | 不良 |

## 7.8、 斜波测试（RAMP）仅 UT516E

斜坡测试：开机后，正常电阻测试模式中，长按“MODE”键选择相应模式，比如 LCD 左下角显示“100V”，右下角显示“1000V”为斜坡测试模式，其中短按“”键或“”键，短按“▲/SET”或“▲/SET”键，可以更改最终目标电压。测试过程，电压会出现以目标电压%10 步进升高到终目标电压。

## 7.9、 背光控制

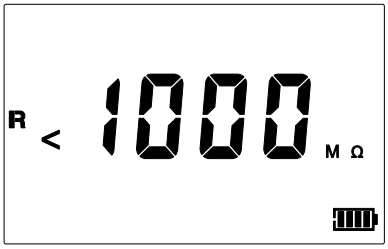
开机后，长按“  ”键可以开启或关闭背光，背光功能适合于昏暗场所。每次开机默认背光关闭。

## 7.10、 报警值设置

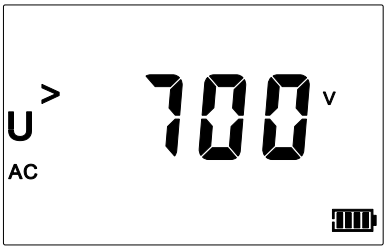
1、开机后，长按“  ”键，开启或关闭报警功能。

2、长按“  ”键可以进入报警值设置模式，通过短按“  ”（加 10）键或“  ”（减 10）键,或者“  ”键（加 1）或“  ”（减 1）键改变当前数字大小。最后长按“  ”键保存并退出。

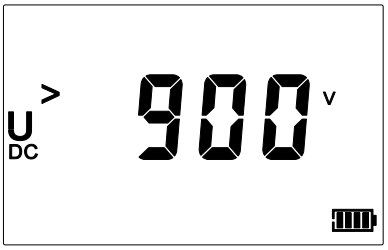
3、当测量电压值大于报警临界设定值或者绝缘电阻值小于报警临界设定值并已开启报警功能，仪表闪烁“  ”符号，并发出“嘟--嘟--嘟--”报警声。直流电压报警设置最大值为 900V，交流电压报警设置最大值为 700V，绝缘电阻报警设置最大值为 9999MΩ。如下图示例显示（“<”小于符号表明小于则报警，“>”大于符号表明大于则报警）。




电阻设置界面




交流电压设置界面

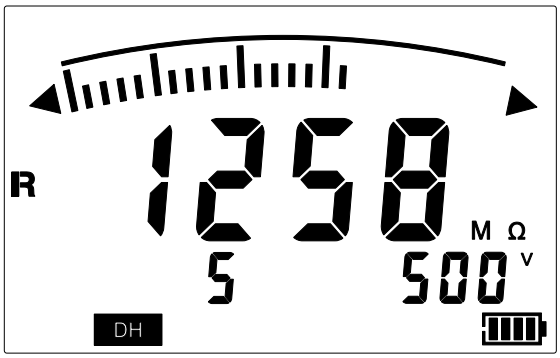



直流电压设置

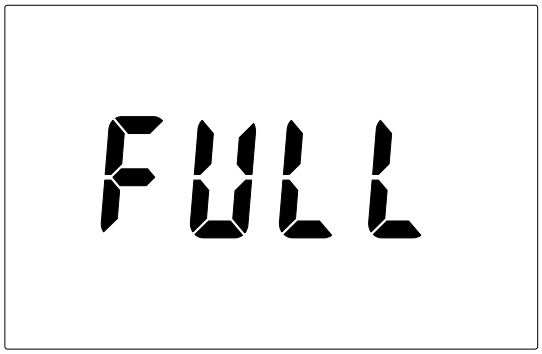
## 7.11、 数据锁定/存储

1、开机后测量完成，短按“  ”键锁定当前显示数据，并自动编号存储，再次短按“  ”键退出锁定，若存储已满，仪表显示“FULL”符号。

2、如下图保存显示示例：测量数据为 1258MΩ，短按“MEM”显示存储为第 5 组数据。




锁定并保存显示

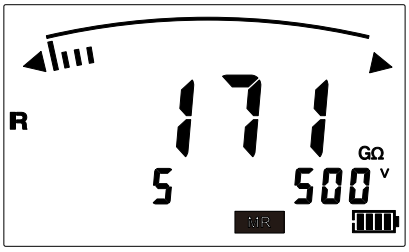



存储已满显示

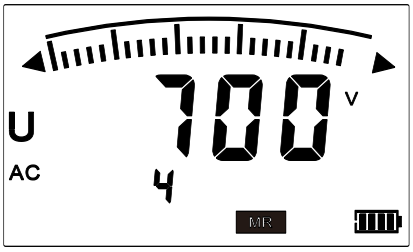
## 7.12、 数据查阅/删除

1、开机后，如果仪表有保存的数据，长按“MEM”键进入数据查阅，存储数据读取界面“MR”符号显示。短按“▲/SET”或“▼/☼”键以步进值为 10 进行查阅对应数据，短按“◄”或“►”键以步进值为 1 进行查阅对应数据，长按“Vsel”键可以打印当前所查阅的数据内容，再长按“MEM”键退出查阅。

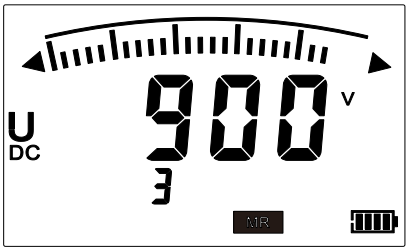
2、如下图：查阅时屏幕左下角数字 5 为当前保存第 5 条数据，若无存储数据，LCD 显示“NULL”。（右下角电阻数据显示测试所用电压，电流和电容显示单位）。



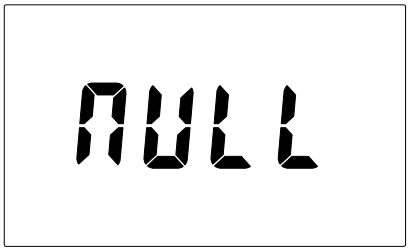

电阻查阅




交流电压查阅

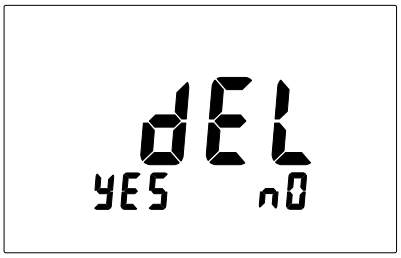



直流电压查阅




无存储数据

3、在数据查阅状态下，短按“  ”键进入数据删除，短按“  ”键不删除并返回查阅界面,短按“  ”键删除所存数据并退出查阅模式，删除页面显示如下图。




**删除显示**

### 7.13、 APP 与 PC 上位机操作

上位机：连接好电脑与仪表的 USB 通讯线，仪表开机，运行监控软件，若 USB 连接成功后，有切换模式测试功能，保存测量数据，即可以读取存储的历史数据，又上传电脑并保存等。

（注意：连接前需要安装好 APP）

蓝牙 APP：仪表开机，在任意界面界面，长按“  ”按键，开启蓝牙或关闭蓝牙。 打开手机已安装好的 APP， 在界面找到“DRT”名称的蓝牙设备， 点击该名称即可连接该设备了。

软件请到优利德官方网站进行下载，https://meters.uni-trend.com.cn

# 八、 电池说明

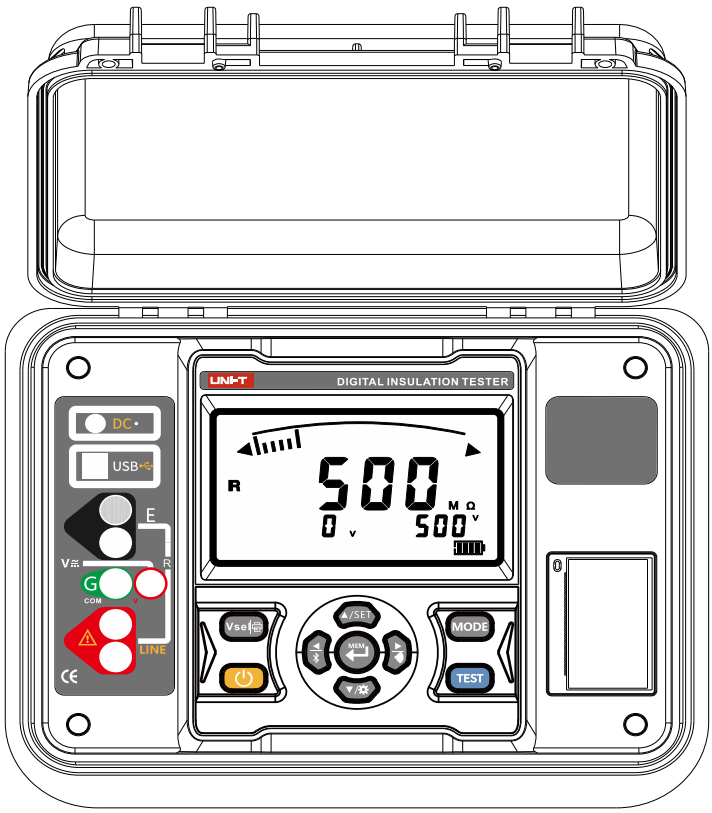
1、仪表采用了 10.95V 锂电池供电，当电池电量不足时，电量符号“  ”显示,请及时充电。**注意：电池电量不足时会影响测量精准度。**

2、测量电压越高对电池电量要求越高。

# 九、 装箱单

| 名称 | 规格 | 数量 |
|---|---|---|
| 仪表 | * | 1 台 |
| 高压棒线 | 3 米/红色 | 1 条 |
| 电阻测试线 | 3 米/黑色 | 1 条 |
| 电压测试线 | 1.5 米/红色；3 米/绿色 | 2 条 |
| USB 通讯线 | 1.5 米 | 1 条 |
| 充电器 | 12.6V/1A/线长 1.1m | 1 个 |
| 说明书 | * | 1 本 |
| 保修证/合格证 | * | 1 张 |
| 布包 | * | 1 个 |

# DIGITAL INSULATION TESTER




# UT513G
# UT515A+
# UT516E
# Operating Manual

# Contents

# 1. Safety rules and precautions

Thank you for purchasing the insulation resistance tester. Before you first use the instrument, to avoid possible electric shock or personal injury, please be sure to read carefully and strictly follow the safety rules and precautions listed in this manual.

In any case, special attention shall be paid to the safety when using this instrument.

- ✧ This instrument is designed, produced and inspected according to the IEC61010 safety specifications.
- ✧ In any case, special attention shall be paid to the safety when using this instrument.
- ✧ When measuring, high frequency signal generator should not be used beside the instrument to avoid errors.
- ✧ Pay attention to the labeled text and symbols of this instrument body.
- ✧ Before use, it is necessary to ensure that the instrument and its accessories are in good condition. The insulation layer of the instrument and the test cables must be intact, without any damage, exposure or breakage. Only then can it be used.
- ✧ During the measurement process, do not contact the exposed conductor and the circuit being measured.
- ✧ Verify that the connection plug for the wire is tightly inserted into the instrument interface.
- ✧ Do not measure in flammable places, the spark may cause an explosion.
- ✧ If the casing or test line is broken, please stop using it.
- ✧ Do not place and store instruments for a long time in high temperature, humidity and condensation places and direct sunlight.
- ✧ When replacing the battery for the instrument, please confirm that the test line has been removed from the instrument and the instrument is turned off.
- ✧ The meter displays the battery voltage low symbol“  ”， Charge it in time, otherwise it will cause error.
- ✧ Charging or data transmission operation is strictly prohibited during the measurement process.
- ✧ Pay attention to the measuring range and operating environment specified in this instrument.
- ✧ The use, disassembly, calibration and maintenance of this instrument must be operated by authorized personnel.
- ✧ Due to the danger of this instrument, the use should be stopped immediately

and sealed immediately, It shall be handled by the authorized and qualified institution.

- ✧ The "⚠" safety warning sign in the instrument and manual must be strictly followed by the user in this manual Allow safe operation.
- ✧ The instrument output high voltage, please be sure to connect the test line before pressing the test button after the hand leaves the test line.Otherwise there is a risk of electric shock.
- ✧ After the test is completed, wait one minute for the discharge before removing the test line, and remove the meter when removing the test line.End of the test line and then close the test line.

# 2. Introduction

**The UT515 series megohmmeter**, also known as an **insulation resistance tester** or **high-voltage insulation resistance tester**, is designed for insulation resistance measurement. This instrument features a large LCD screen with gray-white backlight, data storage, data retrieval, alarm, and automatic shutdown functions. It also measures DC and AC voltages, absorption ratios, and polarization indices. The device boasts an elegant and high-end design, wide measurement range, high resolution, user-friendly operation, and portability. It ensures accuracy, reliability, stable performance, and strong anti-interference capabilities. Additionally, its shockproof, dustproof, and moisture-resistant construction makes it an indispensable tool for industries such as telecommunications, power, meteorology, server rooms, oil fields, electromechanical installation and maintenance, and industrial enterprises that utilize electricity as power or energy sources. It is suitable for measuring the resistance values of various insulation materials, as well as the insulation resistance of transformers, motors, cables, and electrical equipment.

The megohmmeter is composed of medium and large scale integrated circuits. It has a large output power and multiple output voltage levels (6 levels). The DC voltage measurement range is 0～1000V, and the AC voltage measurement range is 0～750V.

# 3. Range and accuracy

## 1. Insulation resistance range and precision

| Measurement function | Output voltage | Measuring range | Precision | Resolution |
|---|---|---|---|---|
| Insulation resistance | 100V(+20%) | 0.05MΩ～0.5MΩ | ±3%rdg±5dgt | 0.001MΩ |
| | | 0.5MΩ～5MΩ | ±3%rdg±5dgt | 0.01MΩ |
| | | 5MΩ～50MΩ | ±3%rdg±5dgt | 0.1MΩ |
| | | 50MΩ～500MΩ | ±3%rdg±5dgt | 1MΩ |
| | | 0.5GΩ～5GΩ | ±5%rdg±5dgt | 0.01GΩ |
| | | 5GΩ～50GΩ | ±10%rdg±5dgt | 0.1GΩ |
| | | 50GΩ～500GΩ | ±20%rdg±5dgt | 1GΩ |
| | 250V(+20%) | 0.1 MΩ～1MΩ | ±3%rdg±5dgt | 0.001MΩ |
| | | 1 MΩ～10MΩ | ±3%rdg±5dgt | 0.01MΩ |
| | | 10 MΩ～100MΩ | ±3%rdg±5dgt | 0.1MΩ |
| | | 100MΩ～1000MΩ | ±3%rdg±5dgt | 1MΩ |
| | | 1GΩ～10GΩ | ±5%rdg±5dgt | 0.01GΩ |
| | | 10GΩ～100GΩ | ±10%rdg±5dgt | 0.1GΩ |
| | | 100GΩ～1000GΩ | ±20%rdg±5dgt | 1GΩ |
| | 500V(+20%) | 0.2 MΩ～2MΩ | ±3%rdg±5dgt | 0.001MΩ |
| | | 2 MΩ～20MΩ | ±3%rdg±5dgt | 0.01MΩ |
| | | 20 MΩ～200MΩ | ±3%rdg±5dgt | 0.1MΩ |
| | | 200 MΩ～2000MΩ | ±3%rdg±5dgt | 1MΩ |
| | | 2GΩ～20GΩ | ±5%rdg±5dgt | 0.01GΩ |
| | | 20GΩ～200GΩ | ±10%rdg±5dgt | 0.1GΩ |
| | | 200GΩ～2000GΩ | ±20%rdg±5dgt | 1GΩ |
| | 1000V(+20%) | 0.5 MΩ～5MΩ | ±3%rdg±5dgt | 0.001MΩ |
| | | 5 MΩ～50MΩ | ±3%rdg±5dgt | 0.01MΩ |
| | | 50 MΩ～500MΩ | ±3%rdg±5dgt | 0.1MΩ |
| | | 500 MΩ～5000MΩ | ±3%rdg±5dgt | 1MΩ |
| | | 5GΩ～50GΩ | ±5%rdg±5dgt | 0.01GΩ |
| | | 50GΩ～500GΩ | ±10%rdg±5dgt | 0.1GΩ |
| | | 500GΩ～5000GΩ | ±20%rdg±5dgt | 1GΩ |
| | 2500V(+20%) | 1 MΩ～10MΩ | ±3%rdg±5dgt | 0.01MΩ |
| | | 10 MΩ～100MΩ | ±3%rdg±5dgt | 0.1MΩ |
| | | 100 MΩ～1000MΩ | ±3%rdg±5dgt | 1MΩ |
| | | 1 GΩ～10GΩ | ±3%rdg±5dgt | 0.01GΩ |
| | | 10 GΩ～100GΩ | ±5%rdg±5dgt | 0.1GΩ |
| | | 100 GΩ～1000GΩ | ±10%rdg±5dgt | 1GΩ |
| | | 1 TΩ～10TΩ | ±20%rdg±10dgt | 0.01TΩ |
| | | 2 MΩ～20MΩ | ±3%rdg±5dgt | 0.01MΩ |

| | | | | |
|---|---|---|---|---|
| | 5000V(+20%) | 20 MΩ～200MΩ | ±3%rdg±5dgt | 0.1MΩ |
| | | 200 MΩ～2000MΩ | ±3%rdg±5dgt | 1MΩ |
| | | 2 GΩ～20GΩ | ±3%rdg±5dgt | 0.01GΩ |
| | | 20 GΩ～200GΩ | ±5%rdg±5dgt | 0.1GΩ |
| | | 200 GΩ～2000GΩ | ±10%rdg±5dgt | 1GΩ |
| | | 2 TΩ～10TΩ | ±20%rdg±10dgt | 0.01TΩ |
| | 10kV(+20%) | 5 MΩ～50MΩ | ±3%rdg±5dgt | 0.01MΩ |
| | | 50 MΩ～500MΩ | ±3%rdg±5dgt | 0.1MΩ |
| | | 500 MΩ～5000MΩ | ±3%rdg±5dgt | 1MΩ |
| | | 5 GΩ～50GΩ | ±5%rdg±5dgt | 0.01GΩ |
| | | 50 GΩ～500GΩ | ±10%rdg±5dgt | 0.1GΩ |
| | | 500 GΩ～5000GΩ | ±20%rdg±5dgt | 1GΩ |
| | | 5TΩ～35TΩ | ±30%rdg±10dgt | 0.01TΩ |
| | 15kV(+20%) | 6 MΩ～60MΩ | ±3%rdg±5dgt | 0.01MΩ |
| | | 60 MΩ～600MΩ | ±3%rdg±5dgt | 0.1MΩ |
| | | 600 MΩ～6000MΩ | ±3%rdg±5dgt | 1MΩ |
| | | 6 GΩ～60GΩ | ±5%rdg±5dgt | 0.01GΩ |
| | | 60 GΩ～600GΩ | ±10%rdg±5dgt | 0.1GΩ |
| | | 600 GΩ～6000GΩ | ±20%rdg±5dgt | 1GΩ |
| | | 6 TΩ～50TΩ | ±30%rdg±10dgt | 0.01TΩ |
| Temperature characteristics: use temperature range plus test accuracy ×0.2/℃. (18℃ to 28℃ outside) Calculation method: Accuracy = (current gear accuracy) + 0.2×(temperature difference)× (current gear accuracy) Example: Using environment 8℃/10kV the first gear accuracy is ±3%rdg±5dgt accuracy = (±3%rdg±5dgt) + 0.2×10×(±3%rdg±5dgt) =9%rdg±15dgt. | | | | |

**Note:** 1、For each voltage range, the two lowest measurement intervals exhibit the phenomenon where the smaller the resistance, the greater the voltage drop. This is a normal occurrence.

2、The testing time for the last two measurement ranges of each voltage level is longer than 100 seconds.

**Conversion of common electrical units:**

1 GΩ（Giga ohm）=1000MΩ=$10^9$Ω

1 TΩ（Tera ohm）=1000GΩ=$10^{12}$Ω

1MΩ（Mega ohm）=1000KΩ=$10^6$Ω

## 2. Voltage range and accuracy

| **Measurement function** | **Measuring range** | **Precision** | **Resolution** |
|---|---|---|---|
| DC voltage | DC 0.0V～1000V | ±1.5%rdg±3dgt | 0.1V |
| AC voltage | AC 0.0V～750V | ±1.5%rdg±3dgt | 0.1V |

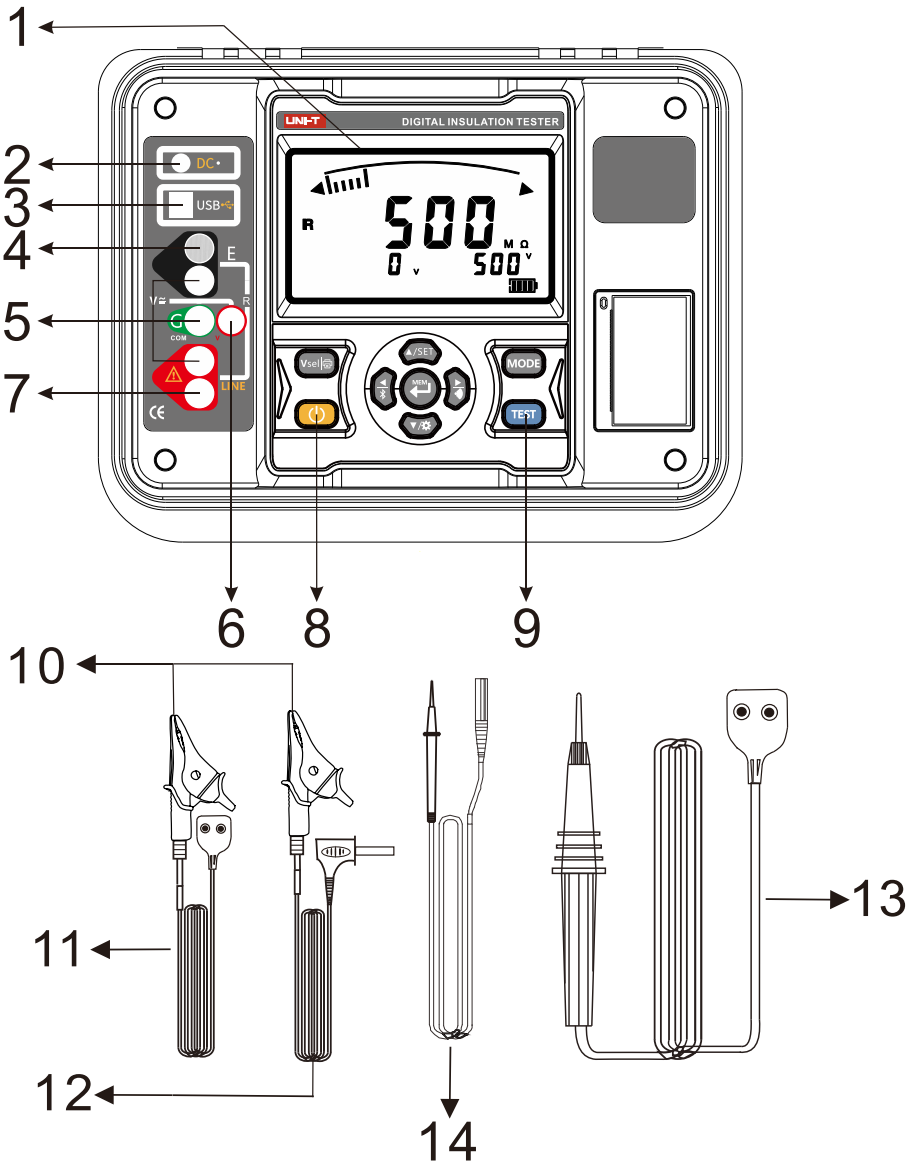
# 4. Technical specifications

| | | | |
|---|---|---|---|
| **Function** | | Insulation resistance test, voltage test | |
| **Base condition** | | 23℃ ± 5℃, below 75% relative humidity | |
| **UT513G** | **Rated voltage** | 100V、250V、500V、1000V、2500V、5000V | |
| | **Insulation resistance range** | 0.05MΩ～10TΩ | Resolution：0.001MΩ |
| **UT515A +** | **Rated voltage** | 250V、500V、1000V、2500V、5000V、10kV | |
| | **Insulation resistance range** | 0.1MΩ～35TΩ | Resolution：0.001MΩ |
| **UT516E** | **Rated voltage** | 500V、1000V、2500V、5000V、10kV、15kV | |
| | **Insulation resistance range** | 0.2MΩ～50TΩ | Resolution：0.001MΩ |
| **Measuring voltage (V)** | | Rated voltage ×（1+20%） | |
| **DC voltage range** | | 0～1000V | Resolution: 0.1V |
| **AC voltage range** | | 0～750V | Resolution: 0.1V |
| **Output short circuit current** | | ≥6mA | |
| **Absorption ratio and polarization index were measured** | | Yes | |
| **Discharge index** | | Yes | |
| **Power** | | 10.95V Charging lithium battery | |
| **Back light** | | Controlled gray screen backlight, suitable for dim use | |
| **Display mode** | | 4-bit super-large LCD display, gray and white screen backlight | |
| **LCD display dimensions** | | 153.8mm×85.6mm | |
| **Instrument size** | | length, width and height：380mm×310mm×153mm | |
| **USB** | | It has a USB port, software monitoring, and can upload stored data to a computer for printing | |

| | |
|---|---|
| **Mobile APP** | Yes, Bluetooth connection, software monitoring, stored data can be uploaded to the computer, save printing |
| **Communication line** | USB communication line 1 pcs |
| **Test cables** | The red high-voltage rod is 3 meters long, the black resistance test input line is 3 meters, the red line is 1.5 meters, and the green line is 3 meters. |
| **Data storage** | 300 groups, flashing the FULL symbol indicates the storage is full |
| **Data access** | Data access function: "MR" symbol display |
| **Overflow display** | Over range overflow function: ">" symbol display |
| **Alarm function** | Yes |
| **Data printing** | Yes |
| **Power consumption** | Standby: 80mA Max (backlight off), open backlight: 90mA Max<br>Measurement: 2.1A Max (backlight turned off) |
| **Instrument quality** | 4.10kg(Including battery) |
| **Battery voltage** | Battery voltage is insufficient, display the low power symbol“ ▭ ” |
| **Auto shut off** | The instrument is shut operated for 15 minutes |
| **Insulation resistance** | ≥50MΩ(Between measuring line and shell) |
| **Withstand voltage** | AC3kV/50Hz 1min |
| **Operating temperature and humidity** | －10℃～+50℃＜85%RH |
| **Storage temperature and humidity** | －15℃～+55℃＜90%RH |

| | |
|---|---|
| **Suitable for safety regulations** | IEC61010-1 、 IEC1010-2-31 、 IEC61557-1,5 、<br>IEC60529(IP54)、Pollution grade 2、CAT Ⅲ 300V |

# 5. Instrument structure

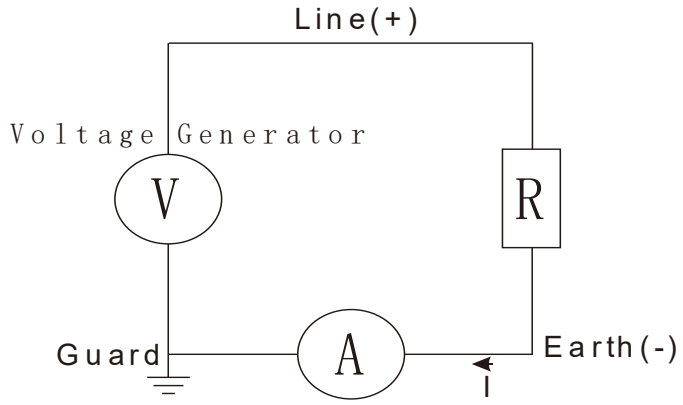



1. LCD Display screen
2. Charging port
3. USB interface
4. EARTH interface
5. GUARD interface
6. V interface
7. LINE interface
8. ON/OFF key
9. Test key
10. Safe dolphin clip
11. EARTH Interface test cable
12. Test cable (green)
13. High-pressure test end banana plug plug into the LINE interface
14. Voltage testing probe (red)

# 6. Measuring principle

The insulation resistance is measured using a voltage generator to generate a

voltage V, which is applied to both ends of the resistance. By measuring the current I at both ends of the resistance, and the grounding resistance value R is calculated according to the formula R=V / I.




-

# 7. Operational approach

## 1. Startup & Shutdown

Press the POWER key to realize the switch machine."APO" is displayed in the lower right corner after starting up, and it will automatically shut down after 15 minutes without operation.

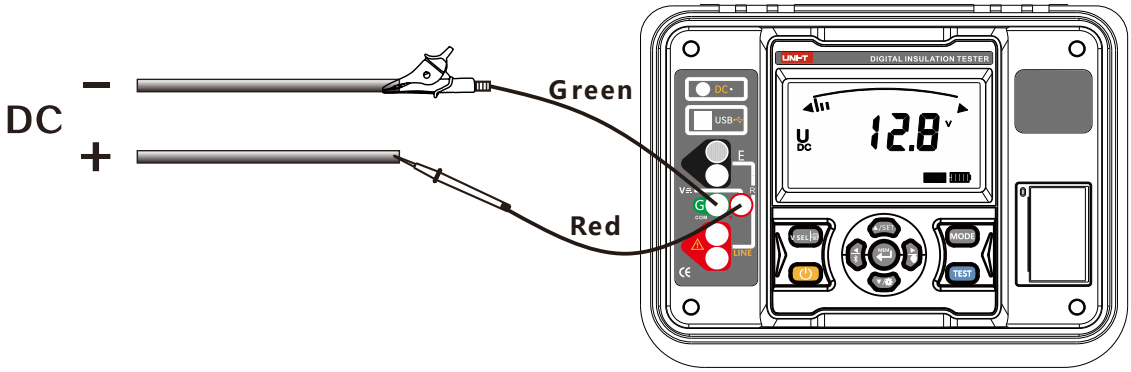
## 2. Battery voltage check

After boot, if the LCD displays the battery voltage low symbol“▭”，It means that the battery power is insufficient, so please charge it in time. The battery power is sufficient to ensure the accuracy of the measurement.

### 3. DC voltage test

| | |
|---|---|
| ⚠ | **The input instrument DC voltage shall not exceed 1000V.** |

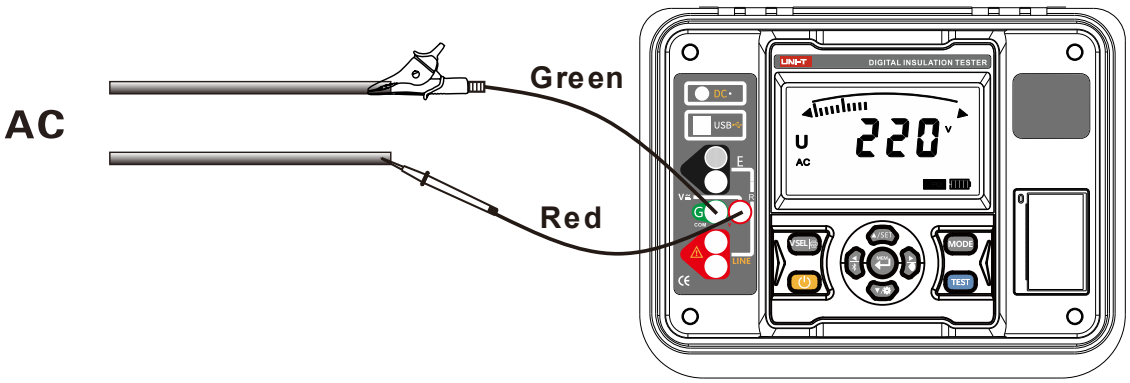
To measure, press the "MODE" button briefly to switch to DC voltage test mode. Connect the red probe to the **V** terminal and the green test line to **COM**. The LCD will display the real-time DC voltage value. Press and hold the "Vsel" button to print the current voltage measurement.




### 4. AC voltage test

| | |
|---|---|
| ⚠ | **The input meter AC voltage shall not exceed 750V.** |

To test, press the "MODE" button briefly to switch to AC voltage mode. Connect the red probe to the **V** terminal and the green test line to **COM**. The LCD will display the real-time AC voltage value. Press and hold the "Vsel" button long to print the current voltage reading.



## 5. Insulation resistance test

| | |
|---|---|
|  | **The insulation resistance test can only be conducted on the uncharged circuit. Before the test, check whether the test wire is intact and the tested circuit is charged. If the live line may damage the instrument and affect the measurement accuracy.** |
| | **High-voltage insulating gloves must be worn for operation.** |
| | **During the insulation resistance range, the high voltage occurs in the test line head and the test circuit after pressing the test switch. Please pay attention to avoid touching.** |
| | **Always connect the ground wire (black) to the ground port of the measured circuit.** |
| | **Do not touch the circuit immediately after testing. The stored charge may cause an electric shock accident.** |
| | **Do not remove the test line immediately, you must touch the test circuit after the discharge is completed.** |
| | **Do not wrap the test lines together for the measurement accuracy test.** |

### 1、Notes to test the high-voltage insulation resistance:

| | |
|---|---|
|  | **The greater the resistance value of the high voltage insulation material, the smaller the current passing through the DC voltage, which is easy to be affected by the external environment interference, resulting in a large test error.** |
| | **The higher the measured resistance value, the longer the measurement time.** |
| | **Humidity increases, the surface leakage increases, and the body conductance current also increases.** |
| | **The resistance value of the general material decreases with the increase of the ambient temperature and humidity.** |

### 2、Ensure the temperature and humidity value of the insulation resistance accuracy

| Insulation resistance range | Ensure the humidity value of the insulation resistance accuracy | Ensure the temperature value of the insulation resistance accuracy |
|---|---|---|
| 0Ω-100MΩ | <85% RH(No condensation) | 23℃±5℃ |
| 100MΩ-20GΩ | <75% RH(No condensation) | |
| 20GΩ-200GΩ | <65% RH(No condensation) | |
| 200GΩ-1TΩ | <55% RH(No condensation) | |
| 1TΩ-10TΩ | <45% RH(No condensation) | |
| 10TΩ-50TΩ | <35% RH(No condensation) | |

### 3、Insulation resistance test operation

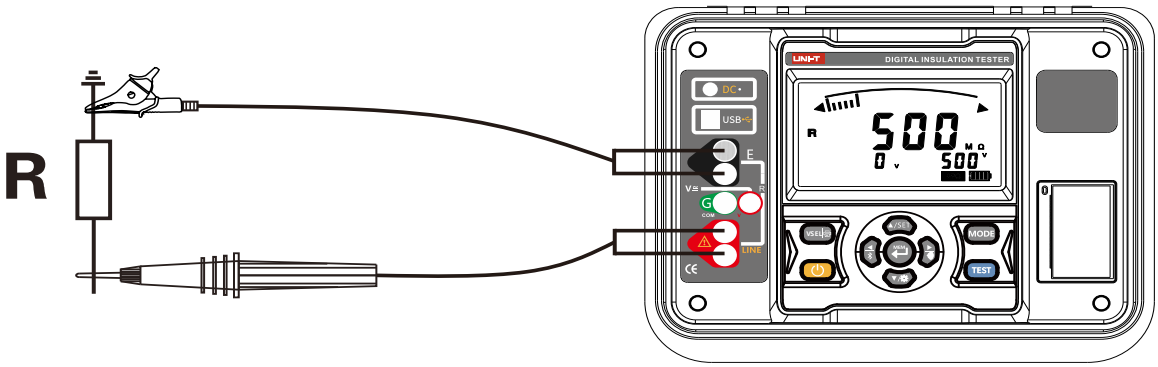
1、The insulation resistance test can only be conducted on an uncharged circuit. Before the test, check whether the test wire is good and confirm whether the tested circuit is live.(When testing large capacity products (cables, large capacity transformers, etc.), please press the test key long for 3 seconds to enter the standard test mode. The screen displays the NOISE symbol)

2、 Press the " 

" button to switch to resistance measurement mode, then press the " 

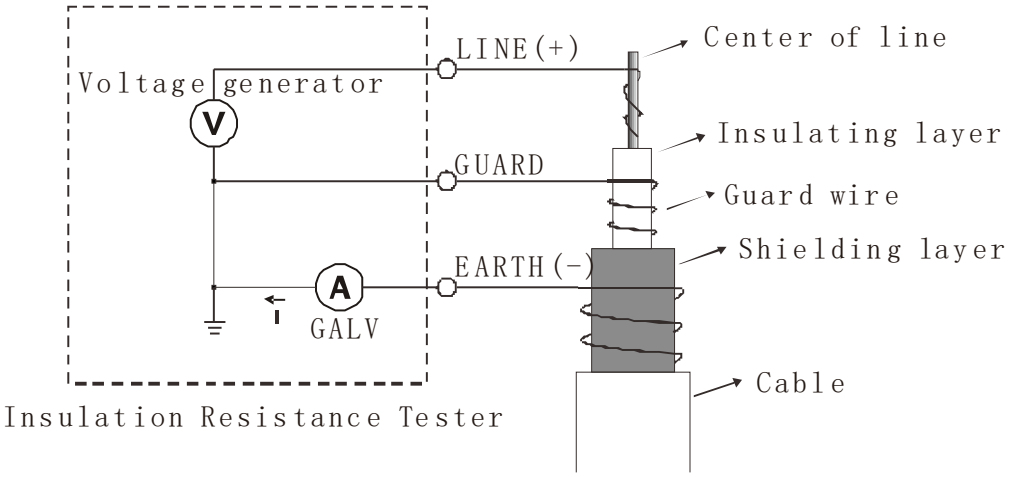
" button to select the voltage value to test.

3、The black grounding wire connects to the instrument's EARTH terminal at one end and to the test circuit's grounding terminal at the other. The red high-voltage rod test wire connects to the instrument's LINE terminal at one end and contacts the test circuit at the other. Press the "TEST" test button to initiate the test (the instrument will emit intermittent beeping: "beep~ beep~ beep..."). Wait until the displayed value stabilizes before reading the insulation resistance value. Long-press the "Vsel" button to print the current insulation resistance measurement.




## 6. Use of GUARD protective wire

When measuring the insulation resistance of the cable, the leakage current on the covering surface merges with the current through the insulator, resulting in the error of the insulation resistance value. In order to avoid this phenomenon, as shown in the following figure, use the protection wire (any conductive bare wire) to roll up the leakage current through the part. After being connected to the protection port, the leakage current does not flow through the indicator meter, and the insulation resistance of the insulator can be accurately measured. Please connect the protection port using the attached protection test line.



## 7．Polarization index (PI) and absorption ratio (DAR) Filtering test

### 1、Polarization index (PI) and absorption ratio (DAR) action

The polarization index (PI) and absorption ratio (DAR) are tests to check for the leakage current of the insulator. Confirm that the leakage current does not increase. The instrument automatically calculates the polarization index PI and the absorption ratio DAR value, as the basis for judging the insulation performance, the polarization index PI and the absorption ratio DAR both represent the change of the insulation resistance in a period of time after the measured object bears the measured voltage.

### 2、Difference between polarization index (PI) and absorption ratio (DAR):

For the general insulator testing, Such as shell insulation, tool handle and other generally in a short time can test whether the leakage current increases with the applied voltage time increases, So you can usually test it in a short time, The insulation resistance ratio DAR for the short time test is called the absorption ratio (see the formula below for the specific test time), However, for the tested products with a large capacity and a long absorption process, Such as transformers, generators, cables, capacitors and other electrical equipment, Sometimes the absorption ratio (DAR) is not sufficient to reflect the whole process of absorption, Long-time insulation resistance ratio can be used, That is, the ratio PI of insulation resistance (R10min) to l min (R1min) to describe the whole process of insulation absorption, The PI is called the polarization index,

The PI and DAR values are calculated by the following formula:

$$\text{PI (Polarization Index)} = \frac{R10Min}{R1Min}$$

DAR (Absorption Ratio) $= \frac{R60Sec}{R15Sec}$

DAR (Absorption Ratio) $= \frac{R60Sec}{R30Sec}$

**Note：**

**1：R10Min=The voltage was applied to the resistance values measured for 10 minutes**

**2：R1Min=R60Sec=The voltage was applied to the measured resistance value for 1 min**

**3：R30Sec=Voltage was applied to the resistance value measured for 30 seconds**

**4：R15Sec=Voltage was applied to the resistance value measured for 15s**

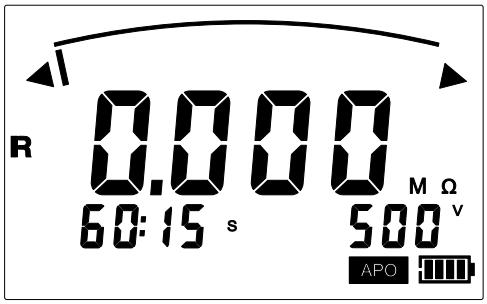
**5：The calculation time of DAR can be 15 or 30 seconds.**

**3、Polarization index (PI) and absorption ratio (DAR) test**

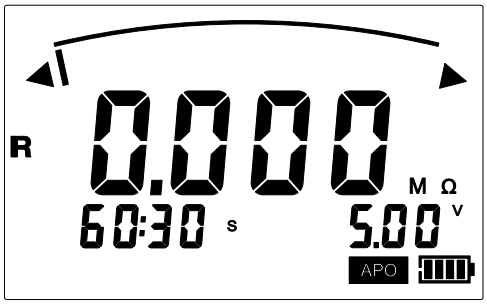
1、Polarization index (PI) and absorption ratio test (DAR) can only be performed on an uncharged circuit. Before testing, check whether the test wire is good and confirm whether the tested circuit is charged.

2. Press the "MODE" button to switch to resistance measurement mode, then press the "Vsel" button to select the voltage value to test.

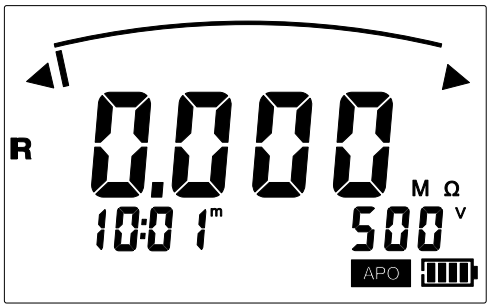
3. Press and hold the "MODE" key to select the mode. The LCD displays "10:01m" for the polarization index mode, "60:15S" for the 15-second absorption ratio mode, "60:30S" for the 30-second absorption ratio mode, and nothing in the lower left corner for the insulation resistance measurement mode.



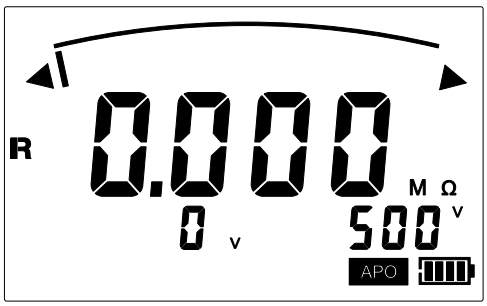

Absorption Mode 15-second Mode




Absorption ratio mode 30-second mode




The polarization index pattern

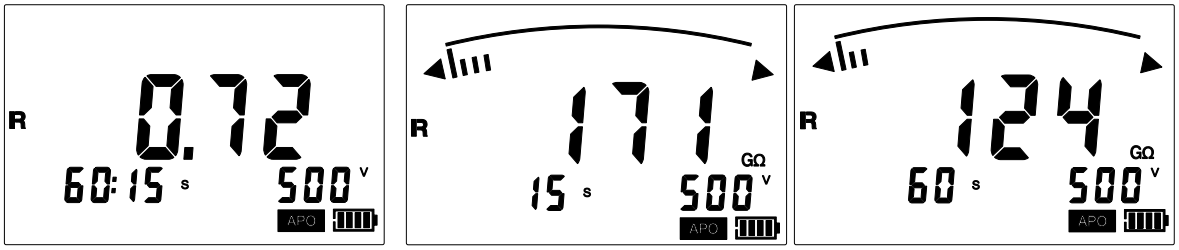



Insulation resistance measurement mode

4、Ground wire (black) one end of the instrument to the other end of the EARTH end to the ground end of the test circuit. One end of the high pressure rod test line (red) is connected to the other end of the instrument LINE end and the head contacts the test circuit，Press "TEST" test key starts the test and can read the absorption ratio or polarization index value until the measurement is fixed.

5、After the test is completed press "▲/SET" Key switch to view the absorption ratio or polarization index value of the divisor, ratio, or press "▼/☼" Key switch to view the ratio and divisor of absorption ratio or polarization index value (for example, in the "60:15S" mode, the lower left corner displays "60:15S" as the ratio, "15S" as the divisor, and "60S" as the dividend. The same applies to other modes.).

6、Long press the "Vsel" key to print the current measured "ratio", "dividend", and "divisor"

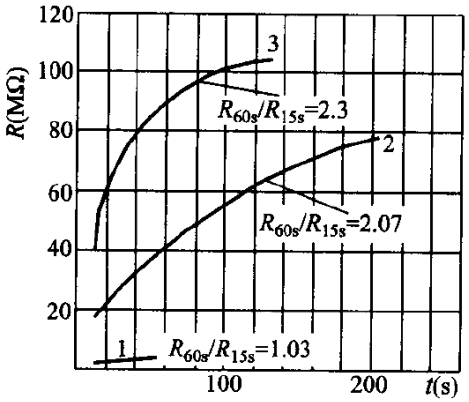



ratio The divisor by divided

**4.Polarization index (PI) and absorption ratio (DAR) application:**

In engineering, the insulation resistance and absorption ratio (or polarization index) can reflect the moisture degree of generator, oil-immersed power transformer and other equipment insulation. The absorption ratio (or polarization index) of insulation decreases after moisture (see Figure 1), so it is an important indicator to judge whether insulation is damp.

It should be noted that sometimes the insulation has obvious defects (such as the insulation breakdown at high pressure), and the absorption ratio or polarization index value is still very good. The absorption ratio or polarization index cannot be used to detect local insulation defects other than moisture and dirt.




1- 15°C before drying; 2- 73.5°C at the end of drying; 3 -After 72 hours of operation, and cooled to 27°C
FIG. 1 Relationship between insulation resistance R and time t for a certain generator

## Reference value of polarization index:

| Polarization index | 4 Above | 4～2 | 2.0～1.0 | Below 1.0 |
|---|---|---|---|---|
| Judge | Best | Good | Attention | Badness |

**Reference value of absorption ratio:**

| Absorptance | 1.4 Above | 1.25～1.0 | Below 1.0 |
|---|---|---|---|
| Judge | Best | Good | Badness |

### 8．Ramp Test (RAMP)Only UT516E

Ramp test: After turning on the device, in the normal resistance test mode, press and hold the "  " key to select the corresponding mode. For example, when "100V" is displayed in the lower left corner of the LCD and "1000V" is displayed in the lower right corner, it indicates that the ramp test mode is selected. During the test, the voltage will increase in steps of 10% of the target voltage until it reaches the final target voltage. Short press the "  " or "  " key, or the "  " or "  " key to change the final target voltage.

### 9．Backlight control

After boot, long-press the "  " key can turn on or off backlight, backlight function is suitable for dim places. The default backlight is off each time.

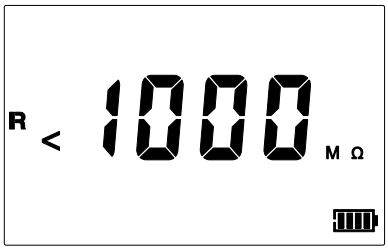
### 10．Alarm Value Settings

1. After powering on, press and hold the "  " key to enable or disable the alarm function.

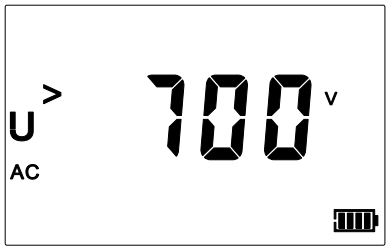
2. Long press the "  " key to enter alarm value setting mode. Use the "  " (up 10) or "  " (down 10) keys, or the "  " (up 1) or  "" (down 1) keys to adjust the current number size. Finally, long press the "  " key to save and exit.

3. When the measured voltage value is greater than the alarm critical set value or the insulation resistance value is less than the alarm critical set value,

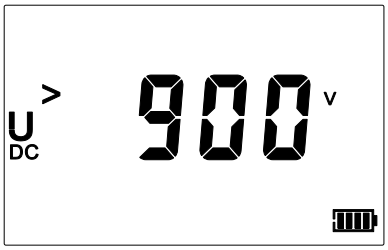
the alarm function has been turned on，The instrument flashing“ ”Symbol, and issued a "du- -du- -du- -" alarm sound. The maximum DC voltage alarm is 900V, the maximum AC voltage alarm is 700V, and the maximum insulation resistance alarm is 9999 MΩ. The following example shows ("<" less than symbol indicates less than alarm, ">" greater than symbol indicates greater than alarm):




The resistance setting interface




The AC voltage setting interface

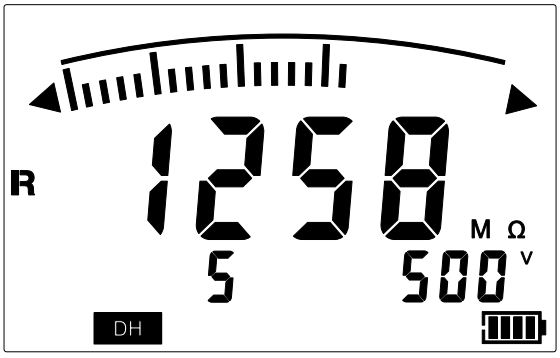



The DC voltage setting

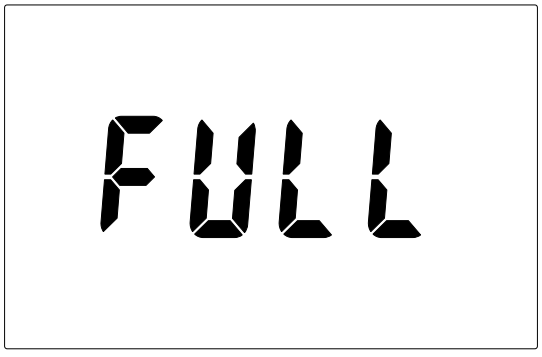
## 11. Data locking / storage

1.After starting, the measurement is completed,press "MEM" key lock the current display data, and automatically numbered storage, press again "MEM" key exit lock, if the storage is full, the instrument displays the " **FULL**" symbol.

2.The following display example: the measurement data is 1258 MΩ, short press "MEM" Display is stored as the group 5 of data.




Lock and save the display



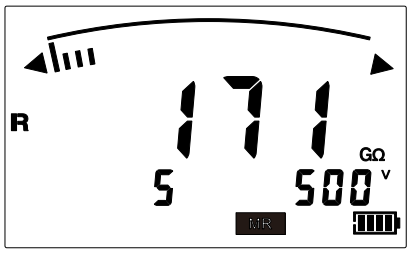

Storage is fully displayed

## 12. Data review / deletion

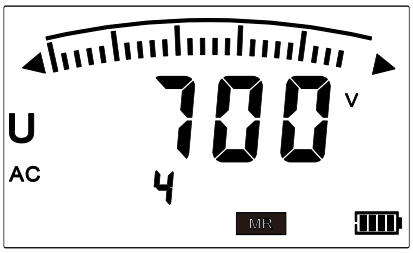
1. After startup, if the instrument contains saved data, long-press the "MEM" key to access the data viewing interface, where the "MR" symbol appears. Short-press the "▲/SET" or "▼/☼" keys to view corresponding data with a 10-step increment, or

with a 1-step increment. Long-press the "Vsel" key to print the current data, then long-press the "MEM" key to exit the view.

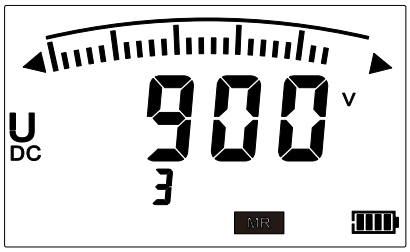
2.As shown in the figure below: the number 5 in the lower left corner of the screen is the current saved fifth data. If there is no stored data, the LCD displays "NULL".(The lower right corner resistance data shows the voltage, current and capacitor display units used for the test).



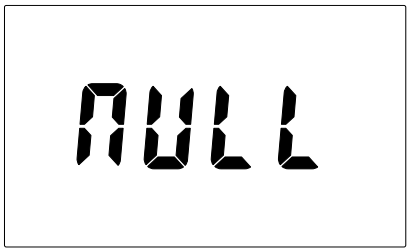

Resistance check




AC voltage Check

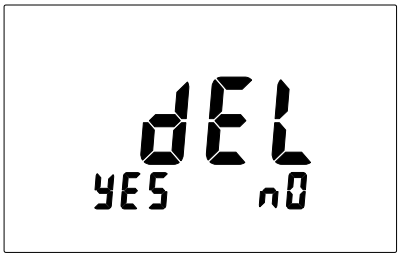



DC voltage Check




No data stored

3.In data viewing mode, short-press the "MEM" key to delete data, short-press the "▶" key to return to the viewing interface without deletion, and short-press the "◀" key to delete saved data and exit viewing mode. The deletion page is shown in the following figure.




Delete display

## 13. APP and PC upper computer operation

Upper computer: connect the USB communication line between the computer

and the instrument, boot the instrument, run the monitoring software, if the USB connection is successful, there is the switching mode test function, save the measurement data, which can read the stored historical data, and upload to the computer and save, etc.

(Note: The APP should be installed before the connection)

Bluetooth APP: Start the instrument, in any interface, long press "  " button to turn Bluetooth on or off. Open the APP installed on the phone, find the Bluetooth device with the name "DRT" on the interface, and click the name to connect the device.

The software can be downloaded from the official website of Youlide. https://meters.uni-trend.com.cn

## 8. Battery instructions

1.The instrument is powered by 10.95V lithium battery. When the battery power is insufficient, the power symbol "  " Display, please charge timely. Note: Low battery power will affect the measurement accuracy.

2.The higher the measured voltage, the higher the battery power requirement.

# 9. Packing list

| Name | Specification | Quantity |
|---|---|---|
| Instrument | * | 1 |
| High pressure rod | 3m/Red | 1 line |
| Resistance test line | 3m/Black | 1 line |
| Voltage test line | 1.5m/Red；3m/Green | 2 lines |
| USB communication | 1.5m | 1 line |
| Charger | 12.6V/1A/line leader 1.1m | 1 |
| Instructions | * | 1 set |
| Warranty Certificate/ Conformity Certificate | * | 1 set |
| Cloth bag | * | 1 |

优利德®


**优利德科技(中国)股份有限公司**

地址：广东省东莞市松山湖园区工业北一路6号
电话：(86-769) 8572 3888
邮编：523 808
http://www.uni-trend.com.cn