TE 8000

抗干扰介质损耗测试仪

Anti-jamming Capacitance and Dissipation Factor Test Sets

说明书

Manual Book

武汉特试特科技有限公司

WUHAN TESTYLE TECHNOLOGY CO.,LTD.

地址: 武汉市东湖高新技术开发区关山二路特1号国际企业中心Ⅱ－2
电话: +86-27-87797003
传真: +86-27-6784 5319
网址: http://www.hvtester.com
E－MAIL: hvtest@yahoo.com

Address: International Enterprises Center II, Guan Shan Road II, East Lake High-tech Development Zone, Wuhan
Tel.: +86-27-87797003 **Fax:** +86-27-6784 5319
Website: www.hvtester.com **E－MAIL:** hvtest@yahoo.com

一、衷心感谢您使用本公司的产品，您因此将获得本公司全面的技术支持和服务保障。

Firstly, we would like to express our heartfelt thanks for your choosing our product. You will receive overall technical support and service guarantee from our company.

二、本使用说明书适用于TE8000 抗干扰介质损耗测试仪。

Secondly, this manual book is designed for Te8000 Anti-jamming Capacitance and Dissipation Factor Test Sets.

三、当您在使用本产品前，请仔细阅读本使用说明书，并妥善保存以备查考。

Thirdly, before you use this product, please read this manual book carefully and keep it for reference.

四、本仪器有高压输出，请严格按说明书要求步骤操作，使用不当可能危及人身安全。

Fourthly. follow the steps strictly, any wrong operating can affect the personal safety.

五、在阅读本说明书或仪器使用过程中如有疑惑，可向我公司咨询。

咨询电话：+86-27-87797003

Fifthly, if you have any question when you read this manual book or use the equipment, please feel free to contact us.

Hotline: +86-27-87797003

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1.1 用途 Application

TE8000 抗干扰介质损耗测试仪是我公司吸收国内外同类仪器的优点，精心设计研制而成的一种能全自动测试介质损耗角正切（tgδ）和电容值（Cx)的智能化仪器。广泛适用于电力行业中变压器、互感器、套管、电力电缆、电容器、绝缘子、高压开关、避雷器等设备的介质损耗测试，用以鉴别电气绝缘在制造过程中的质量，以及长期运行于电力系统中的污染、破裂、穿孔、老化、受潮等缺陷。适用于500KV及以下电压等级电站等干扰强烈的现场试验。

Te8000 Anti-Interference Dielectric Loss Tester, absorbing merits of the same kind of products in the world, is a full automatic intelligence device elaborately designed and developed by our company for testing dielectric loss angular tangent value (tg δ) and capacitance value (Cx), which can be widely used in the equipment dielectric loss test of electricity industry, such as transformer, instrument transformer, adapter pipe, power cable , capacitor, insulator, high voltage switch, arrester and etc. so as to identify the quality of electrical insulation during the manufacturing and the defects of pollution, crack, perforation, ageing, damping and so on that exist in the electricity system for a long time. The tester is adaptable to on-the-spot test with heavy interference for power station with voltage of 500kV and below level.

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概述

Overview

1.2 性能特点 Performance characteristics

（1）**反干扰源：**仪器先测量干扰电流的幅值和相位，然后在内部产生一个幅值相等、相位相反的反干扰信号来抵消干扰电流，从而有效消除现场干扰对测试数据的影响。实践使用证明，该方法抗干扰效果优于“倒相法”、“移相法”和“变频法”。

(1) Counter- interference source: The tester measures the amplitude value and phase of interference current, then a counter- interference signal will be generated inside to eliminate the interference current that is equivalent to the amplitude value but contrary to the phase, thus effectively eliminate the impact of spot interference to testing data. Practice proves that the anti- interference effect is better than “paraphrase method”, “phase shift method” and “frequency variation method”.

（2）**整体屏蔽：**采用双层整体屏蔽机箱，能有效阻挡外界电磁干扰。采用高压屏蔽软电缆，可直接引至试品，测试安全方便，并有效消除了对地杂散电容的影响。

(2) Bulk shielding: The tester adopts double bulk shielding case that can efficiently resist the outside electromagnetic interference. It adopts high tension shielding soft cable that can be directly connected to the tested product, which is safe and convenient and effectively eliminates the impact of ground stray capacitance.

（3）**使用方便**：可自由选择输出高压，启动后全自动升压测试。采用中文菜单操作，测量电容值、介损值等显示结果直观。内置的前换纸打印机能以中文模式打印记录数据，换纸更加方便。

(3) Convenient for use: It can select freely the high voltage and carry out the test full automatically. It adopts Chinese menu to operate with a visual display of capacitance value measurement and dielectric loss value. The built-in front paper-change printer can print recording data in Chinese mode, the paper-change technology is more advanced: all digital and built-in precision mathematical model.

（4）**技术先进**：全数字化，内建精密数学模型。

（4）Advanced technology: digital, built-in precision mathematical model.

（5）**精度高**：具有较高的分辨率和精度，测试结果重复性好，配上标准油杯后，可测量绝缘油的介质损耗因素。

（5）High precision: It has higher resolution and precision with a better repetition of test result; after equipping with standard oil cup, it can be used in the dielectric loss factor of insulating oil measurement.

（6）**通讯接口**：留有“通讯接口”，其中包括RS232计算机接口方便地与笔记本电脑连接，进行数据处理；和“JTAG在线编程接口”，可由笔记本电脑对仪器进行现场在线编程，可对仪器不拆机进行升级处理；使用时，必须配用专用接线座和专用软件，本仪器不提供此配件。

（6）JTAG: There is a “communication interface” in the tester, including the RS232 computer interface that can connect conveniently with the notebook computer to process the data; the “JTAG online programming interface” can be used in on-the-spot online programming with notebook computer, as well as updating treatment without dismantling the instrument. Special connection and software must be adopted, which the tester will not provide.

（7）**数据记录**：仪器能记录100组测试数据，以测试日期、时间的形式存储，日后可调用查看或打印，有利于历史数据的纵向比较和历史台帐的建立。

（7）Data record: The tester can record 100 groups of test data and store according to the test date and time that can be checked and printed later, which is favorable for the longitudinal comparison of historical data and the establishment of historical account.

（8）**携带方便**：采用一体化结构，设计合理，体积只有同类产品的1/2～2/3，携带十分方便。

（8）Convenient to carry: It adopts integrated structure and rational design with a small size only 1/2 ～ 2/3 of the same kind product, which is very convenient to carry.

2.1 电源方面　Power supply

（1）本仪器使用AC220V电源。

(1) AC220V power supply

（2）应保证仪器供电电源的各接插部件（插座、线接头等）接触良好，并能提供足够的功率。

(2) Better connection of various plug parts and components (socket, wire connection and etc.) and provide sufficient power.

（3）本仪器使用了优质低内阻变压器，为避免开机冲击电流，并将过流开关置于“OFF”，然后再合电源开关。

(3) It adopts excellent low internal resistance transformer, in order to avoid impulse current at start-up, adjust “test voltage” under the status of switch off, put the over current switch at “OFF” position, then switch on the power.

2.2 安全方面　Safety

（1）为了仪器及操作人员的安全，仪器必须可靠接地。

(1) For the purpose of safety of instrument and the operator, instrument must be grounding reliably.

（2）必须保证试品与高压线路隔离。

(2) Insulate the test product and high voltage line.

（3）所有人员必须远离高压。

(3) All persons must be far away from the high voltage.

（4）试验准备时最先接好地线，工作完毕时最后拆除接地线。

(4) It is better to connect the grounding first during the test preparation and remove the grounding in the end after completion.

（5）试验开始前，应先将高压电缆接到测试仪，然后 另一端接试品。试验结束后，应先从试品上断开高压电缆及低压线，然后再从测试仪上取出。这主要是防止试品的感应电压对人体及仪器的伤害。

(5) Before the test, connect the high voltage cable to the tester, and connect the test product at the other end. After the completion of test, disconnect the high voltage cable and low voltage line from the test product first, and then take out from the tester so as to avoid damage of induced voltage from the test product to human body and instrument.

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特别提示

Special Note

（6）在通电情况下，任何人不得插拔任何接线，更不得靠近高压部分。

(6) Under the condition of power on, no one is allowed to plug or pull out any connecting line, and never be close to the high voltage area.

（7）当在室外工作时，请勿将仪器长时间置于太阳下曝晒。

(7) When doing outdoor work, please don't put the instrument under the sun for a long time.

2.3 操作方面 Operation

（1）高压电缆插头应锁紧，插入（或拆除）高压电缆插头时，顺时针（或逆时针）方向旋转后部锁紧帽，并保证插入杆不跟着旋转。

(1) Lock the plug of high voltage cable closely, when plugging in (or removing) the plug of high voltage cable, revolve clockwise (or anticlockwise) the rear clocking cap and ensure the thrusting pole un-rotating at the same time.

（2）接线完毕后，应检查一遍，看看是否有接线错误，接插件是否接触良好。

(2) After connecting all lines, check if there is any error in the line and the plugs are connected well.

（3）应正确选择接线方式，不正确的接线方式将导致不正确的测试结果。

(3) Select correct the line-connecting method; otherwise it will cause incorrect test result.

（4）测试过程中，如有打火、电流表指示左右来回摆动等异常现象，应立即关闭电源并重新检查接线。

(4) During the test, if any abnormal phenomenon, such as fire-strike and to-and-fro oscillations in the ammeter, shut down the power and recheck the connecting lines.

（5）反接测试时，因高压测试导线连接处的金属头及试品裸露在外的金属部份对大地均会产生杂散电容，因此反接测试电容值会比正接测试电容值稍偏大，属正常现象。

(5)In GST, stray capacitance will be produced by the metal head of lead connections and the nude part of the object to be tested to the ground, so the capacitance of GST is larger than the ones of UST, which is the normal phenomenon.

3.1 名称和分类 Name and Classification

（1）名称：TE8000 抗干扰介质损耗测试仪

（1）Name: Anti-jamming Capacitance and Dissipation Factor Test Sets

（2）环境组别：属GB6587.1-86《电子测量仪器环境试验总纲》中的Ⅲ组仪器（即可在室外环境使用）。

（2）Environment group: Belong to instrument of Group III (That is the Instrument able to operate in the outdoor environment) of GB6587.1-86 Environment Test Program for Electronic Measurement Instruments.

3.2 主机结构型式与尺寸

3.2 Structure and Dimension of Body Part

（1）型式：一体化便携式

（1）Type: Integration portable type

（2）外形尺寸：长390mm*宽290mm*高320mm

（2）Boundary dimension: Length 390mm*width 290mm*height 320mm

（3）质量：20Kg

（4）Weight: 20kg

3.3 使用电源 Power

（1）电压：AC220V±10%

（1）Voltage: AC220V±10%

（2）频率：50Hz±1Hz

（2）Frequency: 50Hz±1Hz

3.4 使用环境要求 Environment Requirement

（1）环境温度：-10℃～40℃

（1）Environment Temperature: -10℃～40℃

（2）相对湿度：≤80%

（2）Relative humidity: ≤80%

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技术特征

Technical features

3.5 安全性能 Safety performance

（1）绝缘电阻：＞2MΩ

（1）Insulation resistance: ＞2MΩ

（2）泄漏电流：＜3.5mA

（2）Leakage current: ＜3.5mA

（3）介电强度：电源连线对机壳能承受1500V（50Hz有效值）1分钟耐压。

（3）Dielectric strength: Withstand voltage 1500 V (50 HZ valid) between power cables and case for one minute.

3.6 测试工作方式 Operating Mode of Test

（1）正接法

（1）UST

（2）反接法

（2）GST

（3）抗干扰正接法

（3）Anti- interference UST

（4）抗干扰反接法

（4）Anti- interference GST

3.7 输出功率 Output Power

（1）内部高压最大容量：1.5KVA

（1）Maximum power of internal high voltage: 1.5KVA

（2）输出最大电流：150mA

（2）Maximum output current: 150mA

3
技术特征
Technical features

3.8 介损 Dielectric Loss

（1）测量范围： 0～50%

（1）Measuring range: 0～50%

（2）测量精度：

（2）Measuring precision:

测量内容 Measuring item	电容量范围（Cx） Capacitance range (Cx)	试品类型 Sample type	基本误差 Fundamental error
介质损耗因数 tgδ Tgδ	200pF～40000pF	非接地 Ungrounded	±（2%读数+0.0005） ±（2%of reading+0.05DF）
		接地 Grounding	±（2%读数+0.0010） ±（2%of reading+0.1DF）
	10pF～200pF或40000pF以上 10pF～200pF or 40000pFabove	非接地 Ungrounded	±（2%读数+0.0010） ±（2%of reading+0.1DF）
		接地 Grounding	±（2%读数+0.0020） ±（2%of reading+0.2DF）
	3pF～10pF	非接地与接地 Ungrounded & grounding	

（3）分辨率： 0.0001

（3）Resolution: 0.01%DF

3.9 电容 Capacitance

（1）测量范围：

（1）Measuring range:

10KV：0～40000pF

＜5KV: 0～0.1μF

3 技术特征 Technical features

（2）最小分辨率：0.001pF

（2）Minimum resolution: 0.001pF

（3） 精 度： 正 接 ± （2 %读 数+ 2 p F）

反 接 ± （2 %读 数+ 1 0 p F）

（3）Precision: UST±（2% of reading+2pF）

GST±（2% of reading+10pF）

3.10 电压输出 Voltage Output

（1） 范 围： 1KV、1.5KV、2KV、2.5KV、3KV、5KV

7.5KV、10KV

(1) Range: 1kV、1.5kV、2kV、2.5kV、3kV、5kV 、7.5kV、10kV

（2）失真度： ＜2%THD（10KV下线性负载）

(2)Degree of distortion＜2%THD(10KV underline load)

（3） 精 度： ± （1 %读 数+ 1 0 V）

（3）Precision： ±（1% reading+10V）

3.11 抗干扰性能 Anti-interference performance

$I_{干扰}/I_{试品}$＜2，磁场干扰＜5 高斯下满足测试精度要求。

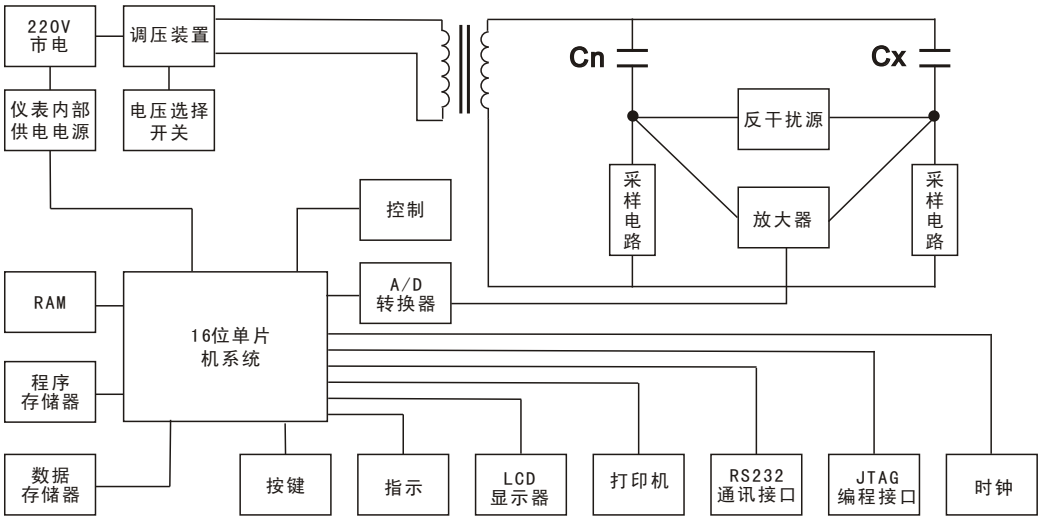
I interfere/I sample＜ 2, Magnetic interference ＜ 5 Gs satisfy the measuring precision requirement.

4.1 内部结构 Internal Structure

仪器将升压与测量装置安装在一个机箱内，仪器内部具有高压输出电压达10KV的升压变压器，还安装有标准高压电容器，使用时无需任何外部设备，便于携带到试验现场使用；双层整体屏蔽机架结构，能有效消除外界电磁干扰，亦能消除杂散电容的影响。仪器方便用户灵活地进行多种方式的测量，仪器结构牢固，确保高、低压电路电气间隙和爬电距离，符合GB4793.1—1995《测量、控制和实验室用电气设备的安全要求》中的有关规定。

With voltage boosting and measuring device in one engine case, the instrument is furnished with boosting transformer of which high voltage output can extend to 10kV as well as standard high voltage capacitor. The instrument is convenient to be carried to the test site and used without any peripheral equipment. Double bulk shielding rack structure can effectively eliminate external electromagnetic interference as well as the impact of stray capacitance. The instrument provides convenience for the customer to make multi-measures flexibly, the instrument has solid structure so as to ensure the electric clearance and creep age distance in conformity with the relevant regulations of GB4793.11995 Safety Requirements for Electrical Equipment of Measurement, Control and Laboratory Use.

4.2 原理框图 Functional block diagram



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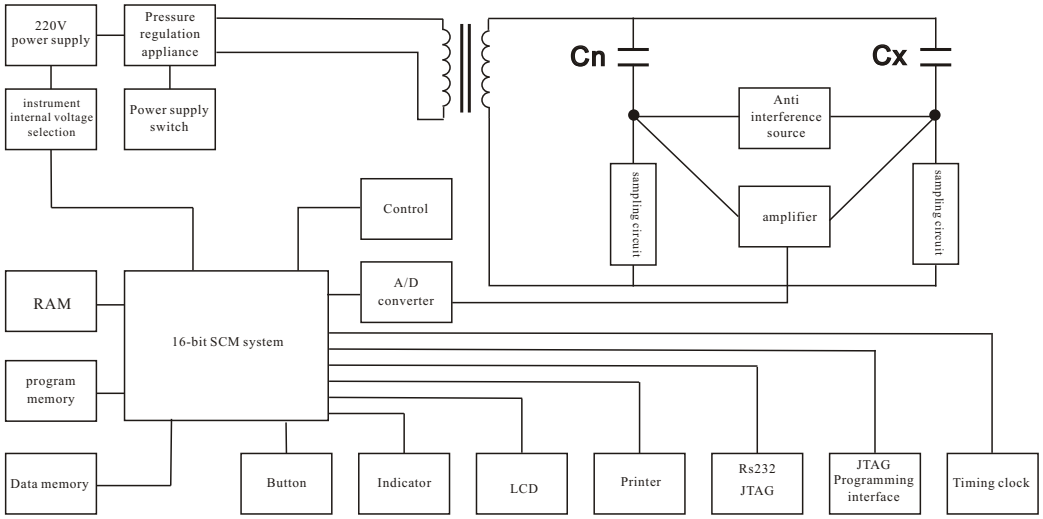
内部结构与工作原理

Internal Structure and Operating Principle



4.3 工作原理　Operating principle

仪器测量线路包括一路标准测量回路和一路被试测量回路。标准回路由内置高稳定度标准电容器与采样电路组成，被试回路由被试品和采样电路组成。由16位单片机运用计算机数字化实时采集方法，对数以万计的采样数据按电工学原理处理后进行矢量运算，分别测出标准回路电流与被试回路电流的幅值及相位关系，并由之计算出试品的电容值（Cx）和介质损耗角正切（tgδ），测量结果可靠。

Measuring circuit of the instrument includes a standard measuring loop and a testing measuring loop. The former consists of built-in high stability standard capacitor and sampling circuit, while the latter consists of test sample and sampling circuit. According to the computer digitalization real time collecting method operated by 16-bit SCM, make vector operation of tens of thousands of sampled data which managed by Electrotechnics principle, detect the current amplitude value of standard loop and testing sample loop respectively as well as the phase relations between the two, figure out the capacitance value (Cx) and dielectric loss tangent（tgδ）of the sample with a reliable measuring result.

4

内部结构与工作原理

Internal Structure and Operating Principle

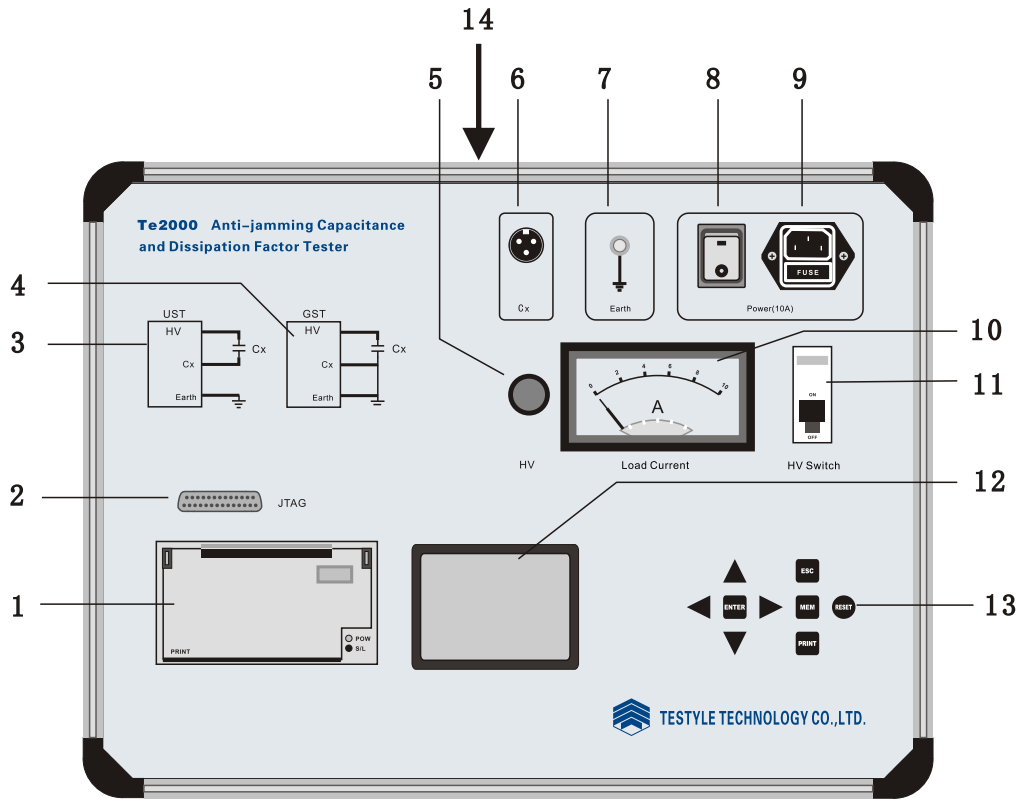
4.4 反干扰源工作原理

4.4 Anti-interference source operating principle

现场有干扰时，仪器测出干扰信号的幅值和相位，然后建立一个和干扰信号幅值相同、相位相反的“反干扰源”，与测量电流叠加，分离出真正的测量电流Ix，然后再进行测试，得到正确的测量结果。

When site interference occurs, the instrument firstly detects the amplitude value and phase of the interfering signal, then establishes an anti-interference source which has the same amplitude value and opposite phase with the interfering signal and overlaps with measuring current, separates the real measuring current Ix, retest and get the correct measuring result.

5.1 面板示意图 Panel Layout



5

面板布置

Panel Schematic diagram

5.2 各部件说明 Descriptions of each part

（1）**打印机**：前换纸型中文打印机，用于测试数据的记录。

（1）Printer: Front changing-paper Chinese printer for the record of the test data.

（2）**通讯接口**：用于与笔记本电脑进行数据通讯，在线编程。

(2) Communication interface: for data communication with notebook, on-line programming.

（3）**正接法接线图**：试品不接地情况下，一般选用正接法测试。

（3）UST wiring diagram: UST is generally adopted if the sample is ungrounded.

（4）**反接法接线图**：试品一端接地情况下，一般采用反接法测试。

（4）GST wiring diagram: GST is generally adopted if one end of the sample is grounded

（5）**高压指示灯**：红灯亮，表示有高压输出。

（5）High-voltage indicator light: If the red light is on, it indicates high voltage output.

（6）**试品输入端Cx**：使用时应根据不同的试品类型与被试品的部位连接，一般接试品的低压端。详见第九章测试图例。

（6）Input end Cx of the sample: Connect to different parts respectively according to various sample types, and the low voltage end is general connected. For details, Chapter 9 Test Diagram is shown.

（7）**接地柱**：为保障操作者的安全及仪器正常工作，使用前应将该接线端子可靠接地。

（7）Grounding rod: To ensure the safety of the operator and the normal operation of the instrument, the grounding terminal shall reliably grounded before use.

（8）**电源开关**：闭合该开关，仪器电源接通。在打开电源开关钱请将过流开关置于“0FF”。

（8）Power switch: Switch on and the power is applied to the instrument. Choose an appropriate testing voltage before turn on the switch and set the over current switch to “OFF”.

（9）**电源插座**：接220V市电，该插座内含保险丝盒，本仪器应安装10A保险丝。

（9）Power socket: Connected from 220V electric supply, including fuse box, and 10A fuse for the instrument.

（10）**电流表**：仪器工作电流指示，升高压时，监视该表，能观察是否有放电、接触不良等故障。

（10）Ammeter: Working current indicator of the instrument, when high voltage applied, monitoring the ammeter can check the failure of discharge or loose contact.

（11）**过流开关**：将过流开关置于“0FF”时，将断开升压回路。升压时，如发生短路、过载，该开关将自动保护至“0FF”。

（11）Over current switch: Set the over current switch to “OFF”, the voltage boosting loop will be cut off. When voltage boosting, the switch will automatically turn to “OFF” in case of short circuit and over loading.

（12）**中文液晶显示器**：以中文方式显示菜单及测试结果。

（12）Chinese LCD (liquid crystal display): Display menu and testing results with the Chinese mode.

（13）**按键**：详见5.3。

（13）Key: For details, see 5.3.

（14）**高压输出端HV**：**输出0—10KV高压，与该端相连的电缆应为高压屏蔽电缆。**

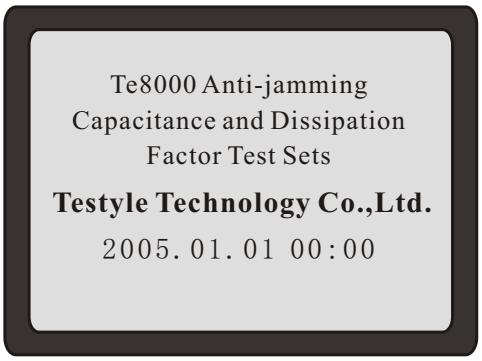
（14）High voltage output end HV: Output 0-10kV high voltages, the cable connected to the end should be high voltage shielding cable.

5.3 按键说明 Description of Key

▲ ▼ ◄ ► 光标的上下、左右移动键及数字的加减。
The cursor up and down, right and left as well as the plus and minus of the number

ENTER	确认选择内容	Confirm the selection
ESC	退出当前菜单	Exit the current menu
RESET	复位到开机状态	Reset to initial state
PRINT	打印出测量的数据	Print the measured data
MEM	存储所测量的数据	Store the measured data

6.1 开机页面 Start-up page



6
页面说明
Start-up descriptions

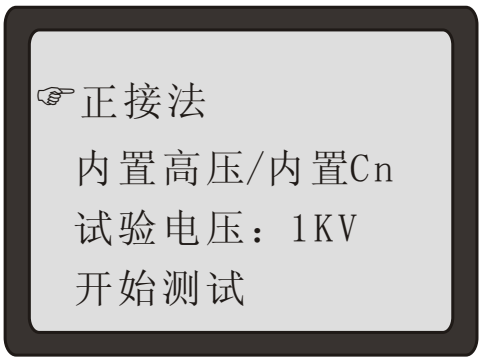
（1）此页面最下一行显示为系统当前的日期和时间，该日期和时间可被修改，具体操作详见6.5。

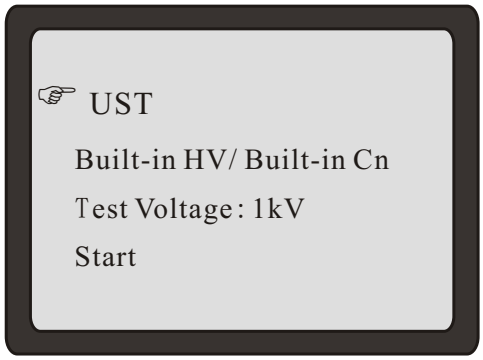
(1) The last line in the page is the current date and time, which are modifiable. See detailed operation in 6.5.

（2）按“确认”键进入主菜单。

(2) Press OK to enter the main menu.

6.2 主菜单 Main menu





（1）按▲▼键，光标上下移动。

（1）Press ▲▼to move the cursor upward and downward.

（2）按◄►键，更改光标位置的菜单项内容。

（2）Press ◄► to change contents of the menu items where the cursor is positioned.

（3）光标停在“正接法”位置时，菜单内容可被更改为“正接法”、“反接法”、“抗干扰正接法”、“抗干扰反接法”。

（3）When the cursor settles on the “UST”, the content of the menu can be changed into UST, GST, Anti-Interference UST, and Anti-Interference GST.

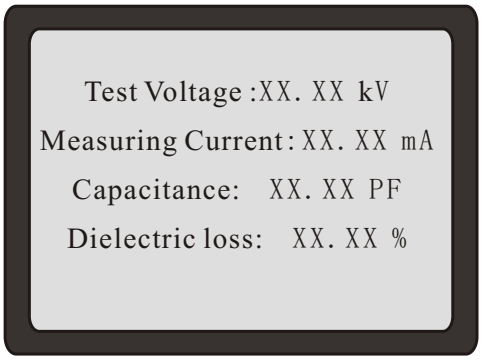
（4）光标停在“开始测试”位置时，菜单内容可被更改为“开始测试”、“数据读取”、“日期设置”、“时间设置”。

（4）When the cursor settles on the Start Testing, the content of the menu can be changed into Start Testing, Data Reading, Date Setting, and Time Setting.

（5）按“确认”键进行测试或完成相应功能。

（5）Press OK to test or complete correspondent function.

6.3 测试数据显示页 Test data display page



（1）按“打印”键，打印出当前测试数据。

（1）Press PRINT to print the current test data.

（2）按“存储”键，将当前测试数据存储。

（2）Press SAVE to store the current test data.

（3）按“复位”键，返回到开机页面。

（3）Press RESET to return to the start-up page.

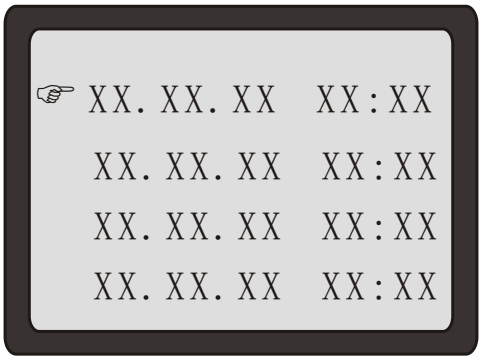
（4）按“退出”键，返回到主菜单。

（4）Press EXIT to return to the main menu.

6.4 数据存储及读取页 Data storage and reading page

在测试数据显示页中，按“存储”键，液晶显示：

Press SAVE in the data storage and reading page, the liquid crystal displays:



（1）按▲▼键，选择存储或读取的位置，可自动换页。

（1）Press▲ ▼to choose position for storage and reading. The pages can be altered automatically.

（2）按“确认”键，确认存储或读取的位置。

（2）Press ENTER to confirm the position for storage and reading.

（3）按“复位”键，返回到开机页面。

（3）Press RESET to return to the start-up page.

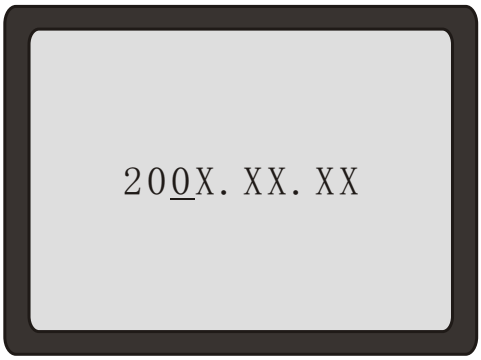
（4）按“退出”键，返回到主菜单。

（4）Press EXIT to return to the main menu.

6.5 日期、时间修改页 Date and time modification page

在主菜单中，光标停在“开始测试”位置时，将菜单内容改为“日期设置”，按“确认”键，液晶显示：

As the cursor settles on START TESTING in the main menu, change the content of the menu to DATE SETTING and press ENTER, the liquid crystal displays:



（1）按 ◄ ► 键，光标左右移动。

（1）Press ◄ ► to move the cursor to the left or right.

（2）按 ▲ ▼ 键，设置日期数据。

（2）Press▲ ▼ to set the date data.

（3）按“确认”键，确认所设置数据。

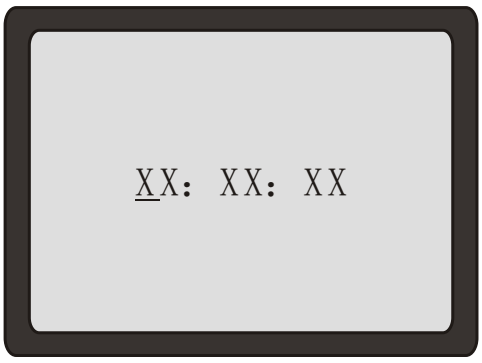
（3）Press ENTER to confirm the set data.

（4）按“退出”键，返回到主菜单。

（4）Press EXIT to return to the main menu.

在主菜单中，光标停在“开始测试”位置时，将菜单内容改为“时间设置”，按“确认”键，液晶显示：

As the cursor settles on START TESTING in the main menu, change the content of the menu into TIME SETTING, and press ENTER, the liquid crystal displays:



（1）按 ◄ ► 键，光标左右移动。

（1）Press◄ ► to move the cursor to the left or right.

6

页面说明

Start-up descriptions

（2）按 ▲ ▼ 键，设置时间数据。

（2）Press▲ ▼ to set the time data.

（3）按“确认”键，确认所设置数据。

（3）Press ENTER to confirm the set data.

（4）按“退出”键，返回主菜单。

（4）Press EXIT to return to the main menu.

6

页面说明

Start-up descriptions

7.1 选择接线方式 Choose connection modes

有四种接线方式可供选择，请仔细分析现场试验条件及被试品情况，选择合适的接线方式。

As four connection modes are available, please choose the appropriate mode according to on-site testing condition and test sample condition.

（1）正接法：非接地试品，现场无干扰。

（1）UST: Ungrounded test samples, with no on-site interference.

（2）反接法：接地试品，现场无干扰。

（2）GST: Grounded test samples, with no on-site interference.

（3）抗干扰正接法：非接地试品，现场有干扰。

（3）Anti-interference UST : Ungrounded test samples, with on-site interference.

（4）抗干扰反接法：接地试品，现场有干扰。

（4）Anti-interference GST: Grounded test samples, with on-site interference.

7.2 设置日期和时间 Set the date and time

在主菜单页面，将光标停在“开始测试”位置，按▶ 键，将相应菜单项改为“日期设置”或“时间设置”，然后按“确认”键，即可更改系统日期或时间。具体操作方法详见6.5。

In the main menu page, put the cursor in the "Start Test" position, press ▶ buttons, modify the corresponding menu item to "date" or "Time Settings", then press "ENTER" button, you can change the system date or time. For detailed methods of operation, see 6.5.

7.3 存储数据 Data Storage

测试一组数据后，仪器将自动显示测试结果，按“存储”键进行数据存储。具体操作方法详见6.3、6.4。

After testing a set of data, the instrument will automatically display the test results, press "Save" button for data storage. For detailed methods of operation, See 6.3 and 6.4.

7.4 读取已存储的数据　Reading the stored data

在主菜单页面，将光标停在“开始测试”位置，按 ► 键，将相应菜单项改为“数据读取”，即进入数据读取功能。具体操作方法详见6.4。

In the main menu page, put the cursor in the "Start Test" position, press► buttons,modify the corresponding menu item to "Reading the stored data", that is the reading data function. For detailed methods of operation, see 6.4.

7.5 打印测试数据　Printing the test data

测试一组数据后，仪器将自动显示测试结果，按“打印”键即可打印测试数据。具体操作方法详见6.3。

仪器也可对以前测试并已存储的数据进行打印，具体操作方法详见6.4。

After testing a set of data, the instrument will automatically display the test results, press "PRINT" button for printing test data. For detailed methods of operation, see 6.4.

Te8000 测试报告
==========
测试人员：
设备编号：
抗干扰反接：
内置CN/内高压：

测试电压：10.00 KV
测试电流：100.0 mA
介损值：0.500 %
电容值：30000 PF
==========
日期:2000.01.01 时间:01:00

Te8000 Test Report
==========
Test staff:
Equipment No.:
Anti-interference GST:
Build-in CN/internal
high-voltage:
Test voltage: 10.00 kV
Test current:100.0 mA
Value of dielectric loss: 0.500 %
C: 30000pF
==========
Date: 2000.01.01 Time: 01:00

7.6 调节液晶显示器的对比度 Adjustment of LCD contrast

由于环境的变化，可能需要调节液晶显示器的对比度。

Due to environmental changes, may need to adjust the LCD contrast.

（1）增强对比度：先按“存储”键不松，再按 ▲ 键，对比度增强。

（1）Enhance the contrast: press "Save" button and hold on not loose, then press ▲ button, contrast enhancement.

（2）减小对比度：先按“存储”键不松，再按 ▼ 键，对比度减弱。

（2）Reduce the contrast: press "Save" button and hold on not loose, press ▼ key to decrease the contrast.

7.7 更换打印纸 Replace the printing paper

本仪器选用前换纸型打印机，不需拆机就可换纸，使用十分方便。

The instrument adopts a printer which Changes paper from the front, which need not to disassemble, and easy to use.

（1）打开打印机前盖板。

(1) Open the printer front cover.

（2）用手捏紧打印机内的纸轴，将其取出。

(2) Hand clenched the paper-axis of the printer, and removes it.

（3）装上打印纸，重新将纸轴装在打印机上。

(3)Mounted on the printing paper, and re-installed paper-axis in the printer.

（4）打开仪器电源，使打印机通电。

(4) Turn on the power supply of instrument, so that the printer powered.

（5）按打印机上“S/L”键，使“POW”指示灯熄灭，此时机头开始走动。用手将纸送入机头入口处，这时纸便徐徐进入机头，直到从机头上露出。

(5) Press the "S / L" button of printer, so that "POW" light is off, and head began to move, and put the paper to the entrance of head, then paper slowly into the nose until the head exposed from the machine.

（6）待纸走出一定长度后，再按一下“S/L”键，打印机停止工作。

(6) The paper is out of a certain length, then press the "S / L" button, the printer stops working.

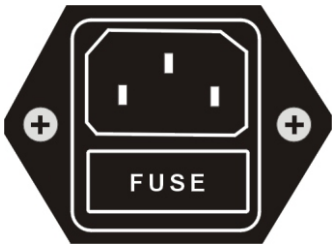
（7）盖上打印机前盖板。

(7) Close the printer front cover.

7.8 更换保险丝 Replace the fuse

在电源插座下方有一个保险丝盒，用平口起子将该保险丝盒往上拉即可更换保险丝。保险丝规格为10A。

There is a fuse box in the bottom of the power outlet, with the flat screwdriver to pull up the fuse box, replace the fuse. The specification of fuse is 10A.



8.1 接线准备 Preparation for connection

（1）将接地线一端夹在地网上，一端可靠的接于面板的接地端子上。

(1) Clip one end of the ground wire to the capacity earth, and connect the other end reliably to the earth terminal on the panel.

注意：地网的接地点应具有良好的导电性，否则会影响测量的正确性，甚至危及人身安全。

Note: the earth point of the capacity earth must have good conductivity. Otherwise, the precision will be affected or it may even endanger the safety of persons.

（2）将测量线插头插入面板的“试品输入Cx”插座并锁紧。

(2) Insert the plug of the measuring line into socket of the “sample input Cx” on the panel and lock it tightly.

（3）将高压电缆头的一端插入箱体后部的高压插座内并锁紧。

（3）Insert one end of the high-voltage pothead to the high-voltage socket on the back of the box body and lock it tightly.

注意：锁紧及拆卸时不要旋转高压插头，插头的白色绝缘部分应保持干燥清洁。

Note: do not rotate the high-voltage plug in locking and removing. The white insulated part of the plug should be kept dry and clean.

（4）将测量线的鳄鱼夹按需夹在试品的信号端上并保证接触良好。

（4）Clip the alligator clip of the measuring line to the signal terminal of the test samples according to needs and ensure well connected.

（5）将高压线的大鳄鱼夹夹在试品的加压端，并保证接触良好。

（5）Clip the big alligator clip of the high voltage line to the pressurization terminal of the sample and ensure well connected.

（6）将电源开关置于“OFF”，过流开关置于“OFF”。

（6）Set the power switch to OFF as well as the over current switch.

（7）插上电源插头。

（7）Plug in the power supply.

8.2 测试步骤 Testing procedure

（1）合上电源开关，仪器显示开机页面，将过流开关置于“ON”。

（1）Turn on the power switch, and the instrument displays the start-up page, then set the over current switch to ON.

（2）按“确认”键，进入主菜单。

（2）Press ENTER to enter the main menu.

（3）根据需要选择适当的测试方式。

（3）Choose appropriate test modes according to needs.

（4）按“确认”键，开始测试。

（4）Press ENTER to start testing.

注意：观察负载电流表，一旦发生异常应立即将过流开关置于“OFF”并关机检查。

Note: observe the load-current meter. Once abnormalities occur, place the over current switch to OFF immediately and shut it down for check.

（5）等待约10～20秒钟，测试完成，仪器显示测试结果。

（5）Wait for about 10～20 seconds, the testing finishes and the instrument shows testing results.

8.3 试验结束后现场清理 Site cleaning after the test.

（1）将过流开关置于“OFF”。

（1）Set the over current switch to OFF.

（2）关闭电源开关，拔下电源线。

（2）Switch off the power, and pull out the supply line.

（3）将高压输出线、测量线、屏蔽线拆除并收好，方便下次使用。

（3）Remove the high voltage output line and keep it for next use.

（4）拆除接地线，并整理好。

（4）Remove the earth wires and put them in place.

9. 测试图例　Test Graph

在以下测试图例中，高压即为仪器的高压输出线；测量即为CX低压测试线中带有小红夹子的测试线；屏蔽即为CX低压测试线中带有小黑夹子的测试线

In the next test legend, high voltage, that is high voltage output line; measurement, that is test line with a red clip in low voltage side; Shielding, that is test line with a black clip in low voltage side.

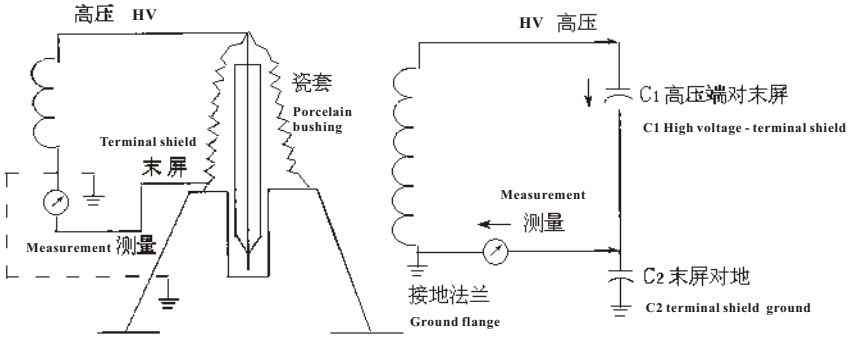
9.1 套管　Bushing

带末屏的电容式套管，如装于大型变压器的电流互感器套管。

Bushing with terminal for capacitive, e.g. current transformer bushing equipped on large size voltage transformer.

（1）测量C1采用正接法测量接线及其等值原理图如下图所示：

（1）Adopting UST to measure C1: see the schematic diagram of measuring, wiring and its principles of equivalence as follows:



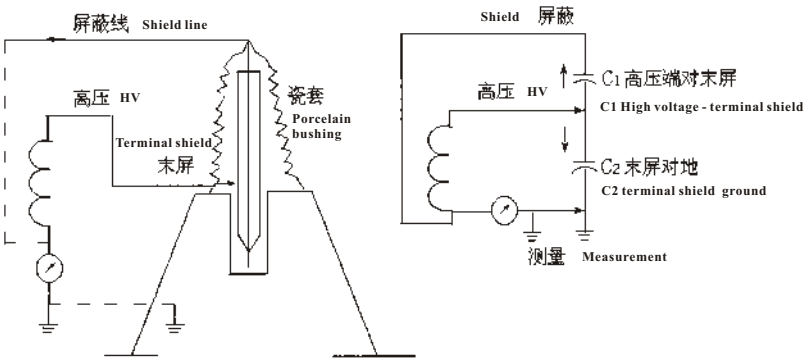
测量套管 C1　Measurement bushing C1

C1—高压对末屏电容　C2—末屏对地电容

C1—High voltage terminal shield capacitance　C2—Terminal shield ground capacitance

（2）测量C2采用反接法，为了消除高压端对地的杂散电容，可将TE2000屏蔽端接到C1上端，接线及其等值原理图如下图所示：

（2）Adopting GST to measure C2: In order to remove stray capacity of the high-voltage end towards the ground, the TE2000 shielding terminal can be connected to the upper end of C1. See the schematic diagram of wiring and its principles of equivalence as follows:



测量套管 C2 Measurement bushing C2

C1 高压对末屏电容 C2 末屏对地电容

C1 High voltage terminal shield capacitance C2 Terminal shield ground capacitance

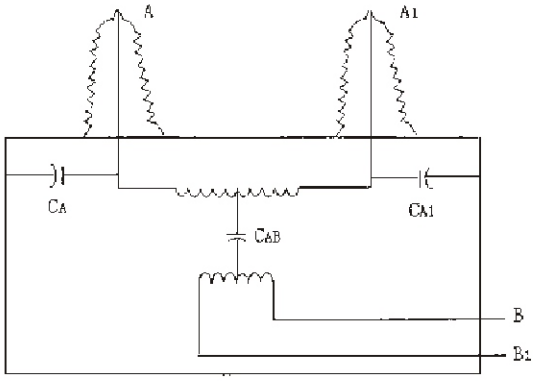
9.2 电压互感器 Voltage transformer

（1）全绝缘式电压互感器

（1）Full-insulated PT

将高压侧及低压侧分别短路，其测量接线及其原理图如下图所示：

Short-circuiting the high voltage side and low voltage side separately: See the schematic diagram of measuring, wiring and its principles of equivalence as follows: (full insulation type voltage transformer)



试品 Sample	试验方法 Test Method	高压 HV	测量 Measuring	屏蔽 Shielding	接地 Grounding
整体 Whole	反接法 GST	AA1 Aa1	地 earth	- -	BB1 Bb1

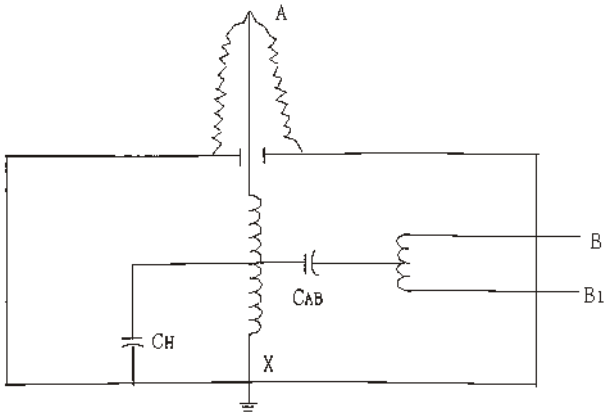
全绝缘式电压互感器 Full-insulated PT

（2）串级式电压互感器

(2) Cascade type voltage transformer

采用串级式电压互感器，一般采用首端加压法。这种试品也可以采用常规方法，但试验电压为2.5KV左右。接线及其等值原理图如下图所示：

Adopt cascade type voltage transformer, generally adopting head-end pressure method. Such samples may also adopt conventional means but the voltage should be about 2.5K. See the schematic diagram of wiring and its principles of equivalence as follows: (full insulation type voltage transformer)



试品	试验方法	高压	测量	屏蔽	接地
Sample	Test Method	HV	Measuring	Shielding	Grounding
CAB	正接法	A	B或B1	—	—
CAB	UST	A	BorB1	—	—
CN	反接法	A	地	B及X	—
CN	GST	A	earth	BandX	—
CAB+CH	反接法	A	地	—	B及B1
CAB+CH	GST	A	earth	—	BandX

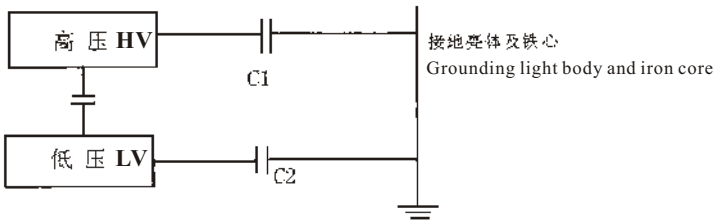
全绝缘式电压互感器

Full-insulated PT

9.3 电力变压器　Power transformer

（1）双线圈变压器接线方法如下图所示：

（1）See wiring of the double wound transformer in the following diagram: (Double wound transformer)



试 品	试 验 方 法	高 压	测 量	屏 蔽	接 地
Sample	Test Method	HV	Measuring	Shielding	Grounding
C1	反接法	高压线圈	地	低压线圈	—
C1	GST	HV winding	earth	LV winding	—
C2	反接法	低压线圈	地	高压线圈	—
C2	GST	LV winding	earth	HV winding	—
C3	正接法	高压线圈	低压线圈	—	—
C3	UST	HV winding	LV winding	—	—

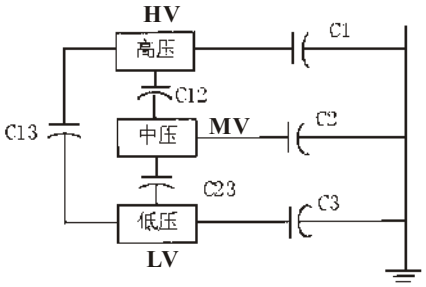
（2）三线圈变压器接线方法如下图所示：

（1）See wiring of the three winding transformer in the following diagram:

9

测试图例

Test Graph



试 品	试 验 方 法	高 压	测 量	屏 蔽	接 地
Sample	Test Method	HV	Measuring	Shielding	Grounding
C1	反接法	高压线圈	地	中压、低压线圈	—
C1	GST	HV winding	earth	M&LV winding	—
C2	反接法	中压线圈	地	高压、低压线圈	—
C2	GST	MV winding	earth	H&LV winding	—
C3	反接法	低压线圈	地	高压、中压线圈	—
C3	GST	LV winding	earth	H&M winding	—
C12	正接法	高压线圈	中压线圈内	—	低压线圈
C12	UST	HV winding	MV winding	—	LV winding
C23	正接法	中压线圈	低压线圈	—	高压线圈
C23	UST	MV winding	LV winding	—	HV winding
C13	正接法	低压线圈	高压线圈	—	中压线圈
C13	UST	LV winding	HV winding	—	MV winding

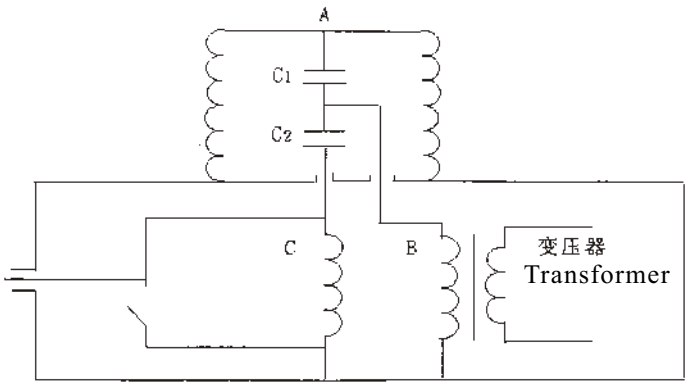
三线圈变压器

Three winding transformer

9.4 电容器 Capacitor

电容式分压互感器接线图如下图所示：

See the wiring diagram of the capacitor voltage division transformer in the following:



试品	试验方法	高压	测量	屏蔽	接地
Sample	Test Method	HV	Measuring	Shielding	Grounding
C1	正接法	A	B	—	—
C1	UST	A	B	—	—
C2	反接法	A	C	—	—
C2	GST	A	C	—	—

9
测试图例
Test Graph

10.1 运输 Transportation

本产品运输时必须进行包装，包装箱可用纸箱或木箱，包装箱内应垫有泡沫防震层。包装好的产品，应能经公路、铁路、航空运输。运输过程中不得置于露天车箱。仓库应注意防雨、防尘、防机械损伤。

This product must be packaged for transportation, packing box can be carton or wooden case, the box should underlay shock-proof layer such as foam, etc. Well Packaged products should be able to transport by road, rail, and air. The products should not be placed in open trunk during transportation, and warehouse should keep away from rain, dust, mechanical damage.

10.2 储存 Storage

仪器平时不用时，应储存在环境温度-20℃～60℃，相对湿度不超过85%，通风，无腐蚀性气体的室内。存储时不应紧靠地面和墙壁。

Equipment should be stored indoors at ambient temperature -20℃ ~ 60℃, relative humidity no more than 85%, ventilation, no corrosive gases. Equipments Should not be placed close to the ground and walls.

10.3 防潮 Damp Proof

在气候潮湿的地区或潮湿的季节，本仪器如长期不用，要求每月开机通电一次（约二小时），以使潮气散发，保护元器件。

In humid areas or damp season, if the equipment seldom use, it must be powered on once a month (about two hours), in order to disperse moisture, and protect electronic components.

10.4 防曝晒 Anti-exposure

仪器在室外使用时，尽可能避免或减少阳光对液晶显示屏的直接曝晒。

When the equipment used outdoors, please keep the equipment far away from sun, and avoid direct sun exposure on the LCD screen.

11.1 220V电源线	一根
11.1 220V Power line	1 piece
11.2 专用测试电缆	一根
11. 2 Special test cable	1piece
11.3 使用说明书	二份
11.3 User Manual	2piece
11.4 专用高压屏蔽电缆	一根
11.4 Special high-voltage shielding cable	1piece
11.5 产品合格证	一份
11. 5 Product certificate	1piece
11.6 打印机说明书	一份
11. 6 Printer manual	1piece
11.7 打印纸	一卷
11.7 Printing paper	1roll
11.8 保险丝（10A）	二个
11.8 fuses (10A)	2 pieces
11.9 双色接地线 （6米）	一根
11.9 double-color grounding line (6 m)	1piece

11
随机附件
Accessories

质量保证与售后服务

Quality Assurance and After-sales Service

（1）本仪器严格按照国家标准和企业标准制造，每一台仪器都经过严格的出厂检验。

(1)The manufacturer of this equipment is in strict accordance with national standards and enterprise standards, the production procedures are strictly enforce the ISO9000 standards to ensure quality of the equipment.

（2）本仪器享有12个月的保用期，在此期间由于制造上的原因而使质量低于特性要求的本公司将免费予以保修。

(2)The warranty of this instrument is 12 months, during this period, we will offer free repair if the technical fault cause by manufacturing.

（3）本仪器实行三包。

(3)The instrument enjoys the warranty of repair and maintenance.

（4）在仪器使用寿命内，本公司将长期提供仪器的维护、使用培训、软件升级、配件供应等相关服务。

(4) We will offer long-term of maintenance, software upgrades, and accessories supply service, etc. within the service life of equipment.

（5）如果在使用中发现问题，请及时与本公司联系，我们将根据情况采取：上门维修指导，或送回或寄回公司维修，或先发备用机给用户使用，后再寄回修理。

(5)Any questions during using, please contact with us, and send the equipment back to our company for repairing.

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售后服务

after-sales service

TE8000抗干扰介质损耗测试仪使用注意事项

The cautions of TE2000 Anti-jamming Capacitance and Dissipation Factor Test Sets

1）本套试验装置必须由熟悉高电压试验技术的人员操作。

1) The equipment should be operated by professionals.

2）使用本套装置请用户必须遵守《电力安规》168条规定，并在工作电源进入试验台前加装两个明显断开点；当更换试品和接线时应先将两个电源断开点明显断开。

2）Read the safety regulation for electic test carefully before usin，and install two disconnected points before powered the console, which should be disconnected when replacing the test sample and the wiring.

3）试验前应先了解被试品的非破坏性试验项目是否合格，若有缺陷或异常，应在排除缺陷（如受潮时要干燥）或异常后再使用介质损耗测试仪设备进行试验。

3）Before testing, make sure that eligibility of non-destructive testing items of the sample. if defects or abnormal, should be to eliminate the defect (such as moisture when dry), or abnormal and then use the dielectric loss tester.

4）试验现场应围好遮拦，挂好标志牌，并派专人监护。

4）Around the test site should be a good masking, hang signs, and arrange personnel for supervision.

5）试验前应将被试设备的绝缘表面擦拭干净，试品表面受潮脏对测试结果会有严重影响。

5)Before the test, test equipment insulation surface should be wipe clean, otherwisewet or dirty will seriously affect the test result.

6）本设备必须保证良好接地，禁止临时打地桩取地或接栏杆、水管等物。

6）The equipment must be grounded to prohibit access to the temporary hit to post or take railings, water pipes and other object.

7）介质损耗测试仪输入电源为频率50HZ，电压220V±10%的交流电压，不可误接380V。

7) Dielectric loss tester input power for the frequency of 50HZ, AC voltage 220V ± 10%, do not erroneous connection of 380V.

8）根据说明书内标示的接线图接好线后，应由专人检查，确认无误（包括引线对地距离、安全距离等）后方可准备加压。

8）Wiring according to the instructions of the wiring diagram of the user manual, someone should check the confirmation (including the lead and earth distance, safe distance, etc.) before preparing increasing voltage.

9）操作顺序：输入电源后，开机选择测试方法（正、反接）-选择输出高压档位-缓速合上空气开关（合上开关瞬间，会从电流表观察到指针的轻微摆动，表示高压接通）-选择测试开始升压-测试完成，对试品放电，拆除引线，测试完成。注意：除非发现危及人身和设备安全的紧急状况，均不可在测试中断开空气开关切断高压，否则试品和设备将会受到操作波高压的冲击可能损坏。

9) Operations steps: turn it on and select the test method (UST and GST) after powered - to select the output voltage stall - Slow closed air switch (momentary switch is closed, will be observed from the ammeter pointer slight swing, said the high is connected) - Select the test and voltage boost - the test is completed, the discharge of the test object, removal of lead, the test is completed. Note: The air switches and high voltage could not cut off during the test unless endanger the safety of persons and emergency, otherwise the test materials and equipment will be impacted by the high wave action and which may be damaged.

10）测试电压的选择：额定电压低于0.8KV可不做介质损耗试验；额定电压0.8~10KV选择额定电压，10KV以上选择10KV。所选择试验电压不得高于被试品额定电压的110%。

10) The choice of test voltage: if rated voltage less than 0.8kV dielectric loss test is optional; if rated voltage is 0.8 ~ 10kV, do select rated voltage, 10kV and above, do select 10kV. The selected test voltage shall not exceed the110% of rated voltage of the test object.

11）本仪器接地试品及非接地试品不需更换接线，只需仪器内部选择“正接”或“反接”即可。现场有强干扰时，可使用“反干扰源法”进行测量。

11）The grounding test object and non-grounding test of the equipment needn't exchange the wiring, choose UST or GST is ok.Using “anti-interference source method" to measure if strong anti-jamming exists on site.

12）高压输出引线为专用特制，测试中无须悬空架起，对测试结果的准确提供可靠保证，请用户在日常注意该线的清洁维护，勿使脏污和受潮。

12）Dedicated a special high-voltage output lead, which needn't hang on during test, provides a reliable guarantee, please keep the daily cleaning and maintenance of the line, Do not allow dirt and moisture.

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注意事项
Operation precaution

13）介质损耗测试受温度、湿度、干扰环境、缺陷部分体积大小等各种因素的影响，如何得到较准确的测试结果对使用人员的素质和经验水平有较高的要求，本设备具备抗干扰测试功能，可给现场人员以很大的帮助，请用户仔细阅读说明书。

13）Dielectric loss test is affected by temperature, humidity, interference environment, the volume size of the defect and other various factors, etc., a higher level of personnel quality and experience required for user on how to get a more accurate test results, the device with the function of the anti-jamming, which can supply helpful information to staff on-site, please read the user manual carefully.

14）变压器的介质损失角，一般在20~40℃的情况下进行测量，以便比较。如果要测量热状态下的介质损失角值，可在变压器自电网断开30min后进行。

14） Transformer dielectric loss angle, usually measures under 20 ~ 40 ℃ for comparison. If you want to measure the thermal state of the dielectric loss value, disconnect the transformer from the grid after 30min.

15）CX输出线为红夹子（小），用于和高压输出线形成回路采集电流信号。屏蔽线为黑夹子（小），用于消除现场环境的干扰，应当指出：屏蔽线的使用具有很高技巧，只要对被测试品电容产生并联和空间耦合的干扰信号，都可以采用该屏蔽线排除。由于现场环境的多样化，需要使用人员对干扰源的产生进行分析和甄别，并进行有效地屏蔽，方能得出更准确的测试结果。

15）CX output lines with the red clip (small), used for high-voltage output lines to form a loop current signal acquisition. Shield line with black clip (small), for the elimination of interference on site, it should be noted: the use of shielded line with high skills, as long as the products being tested in parallel and the space coupling capacitance of the interference signal can be shielded by the Line ruled out. The Diversification of field environment need the staff to analyze the generation and screening, and shield effectively before they can get a more accurate test results.

16）试验过程中，应注意观察电流表计的指示状况，指针式仪表在这方面具有数字式仪表不可替代的直观和灵敏性，在试品存在绝缘缺陷和较大泄漏的情况下尤为明显，由指针的摆动可以及时掌握被试品的电流变化。

16）During the experiment, observe the ammeter meter indicate status carefully. Pointer instrument with the features of more intuitive and sensitive than the digital one, especially in the case of insulation defects and the high leakage current exist in the test object. Through the swing of pointer can grasp the current changes.

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注意事项
Operation precaution

17)对测试结果的判断除应与有关规程进行比较外，还应与历年值进行比较，此外，还可以与同类试品进行比较，看是否存在明显差异，如发生明显变化，可配合绝缘油的分析、直流泄漏试验、提高介质损耗测试电压等方法进行综合判断。

17) In addition to judge the test results should be compared with the relevant regulations, it should also be compared with previous years, can also be compared with similar test sample to see if significant difference exits or not, if so, and with the insulating oil analysis, the DC leakage test, and increased the test voltage of dielectric loss to make integrated judgments.

18)介质损耗试验后均应测量被试品的绝缘电阻，防止造成损伤。

18) Dielectric loss should be measured after the test the insulation resistance of sample, which was to prevent damage.

19）精密仪器，请搬运时轻拿轻放；仪器请保存在干燥的环境中，禁止在雨天使用本仪器。

19） Precision instruments, please gently when handling; instruments save in dry environment, prohibiting use of the equipment in the rain.

13
注意事项
Operation precaution

本公司还备有以下产品，欢迎垂询：

Our company also has the following products, welcome consulting:

1、TE2011 抗干扰氧化锌避雷器测试仪

1. TE2011 Anti-Interference MOA AC Characteristics Tester

2、TE200/TE100 高精度回路电阻测试仪

2. TE100/TE200 High Precision High Current Microhmmeter

3、TE150/TE500 充电式测试仪表电源

3、TE150/TE500 Rechargeable Test Meter Power

4、TE2030 高压开关动特性测试仪

4. TE2030 Circuit Breaker Time Characteristics Analyzer

5、TE6100 便携式继电保护测试仪

5、TE6100 Portable Relay Test Set

6、TE—ZC3 直流电阻快速测试仪

6. TE-ZC3 Rapid Transformer Ohmmeter

7、TE2020 变比组别自动测试仪

7. TE2020 Automatic Turns Ratio Tester

8、TE2040 互感器校验仪

8. TE2040 Transformer calibrator

9、TE6080 油耐压全自动测试仪

9. TE6080 Automatic Insulating Oil Tester

10、JD—2 地网接地电阻测试仪

10. JD2 Ground Resistance Test Set

11、TE2042 PT 二次压降测试仪

11. Series DC High Voltage Generator

公司产品

Other products