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一 概 述

I General

LYCS8800 型异频线路参数测试仪是发电站、变电站等现场或实验室测试各种高压输电线路参数的高精度测试仪器。仪器为一体化结构，内置变频电源模块，可变频调压输出电源。频率可变为 45Hz 或 55Hz，采用数字滤波技术，避开了工频电场对测试的干扰，从根本上解决了强电场干扰下准确测量的难题。同时适用于全部停电后用发电机供电检测的场合。

LYCS8800 type different-frequency line parameters tester is a high-precision tester for measurement of the parameters of various high-voltage transmission lines in power generation plant, transformer substation or labs. The instrument is an integrated structure, with a built-in frequency conversion power module, which can output powers after converting the frequency and regulating the voltage. The frequency can be converted to 45Hz or 55Hz, the instrument adopts digital filtering technique, avoiding the interference of power frequency electric field on the test, thereby solving the difficulty of accurate measurement under the interference of strong field. In addition, the instrument is applicable in the case of power supply detection of electrical generator with power completely cut off.

随着电网的发展和线路走廊用地的紧张，同杆多回架设的情况越来越普遍，输电线路之间的耦合越来越紧密，在输电线路工频参数测试时干扰越来越强，严重影响测试的准确性和测试仪器设备的安全性，针对这一问题，我们开发了新一代输电线路异频参数测试系统，集成变频测试电源、精密测量模块、DSP 高速数字处理芯片；有效地消除强干扰的影响，保证仪器设备的安全，能极其方便、快速、准确地测量输电线路的工频参数。

With the development of grid and the strained land for line corridors, many erections on one lever becomes more and more common, the coupling between power transmission lines becomes closer and closer, the interference during the test of power electric frequency parameters on the power transmission lines is stronger and stronger, which takes great impact on the accuracy of the test and the safety of the testing instrument and equipment. For this issue, we developed a new generation of different frequency parameter testing system for power transmission lines, which integrates the frequency conversion testing power, precision measurement module and DSP high speed digital processing chip; therefore, the tester can effectively eliminate the effects of strong interference, insure the safety of the instrument and equipment, and measure the power electrical frequency parameters of the power transmission lines conveniently, quickly and accurately.

仪器主要具有如下特点：

The instrument is mainly characterized in the following aspects:

- 全触摸超大液晶显示
- **Large Full-touch Screen LCD Display**

操作简单，仪器配备了高端的全触摸液晶显示屏，超大显示界面所有操作步骤中文菜单显示，每一步都非常清楚，操作人员不需要额外的专业培训就能使用。轻轻触摸一下就能完成整个过程的测量，是目前非常理想的智能型测量设备。

Simple in operation; the instrument is equipped with high-end full touch screen LCD display, the large display interface can display all the operating procedures in Chinese menus, all the procedures are clear, so that the operators can use it without any extra professional training. The whole measurement process can be finished by just a slight touch, therefore, the instrument is an ideal intelligentized measuring equipment currently.

- 变频技术、精准测量
- **Frequency Inversion Technique, Precision Measurement**

抗干扰能力强，由仪器内部自带变频电源模块提供仪器测量输出电源，频率可变为 45Hz 或 55Hz，并采用数字滤波技术，有效地避开了现场各种工频干扰信号，使仪器实现高精度、准确可靠的测量。

High interference resistance capability; the measurement output power of the instrument is provided by the auto frequency inverter power module built-in the instrument, which can invert the frequency to 45Hz or 55Hz, and the digital filtering technique is adopted, so that interference signals of various working frequencies at the site are effectively avoided, ensuring a high-precision, accurate and reliable measurement of the instrument.

- **DSP 高速处理器**

- **DSP High-speed Processor**

精准快速，仪器内部采用专业的 DSP 快速数字信号处理器作为处理核心，在保证测量数据精准的前提下，大大的提升了一起本身的运算处理能力。

Accurate and quick; a professional DSP quick digital signal processor is adopted as the processing core of the instrument, under the premise of accurate measurement data, the computing and processing capability of the instrument is greatly improved.

- **操作简单**

- **Simple Operation**

外部接线简单，仅需一次接入被测线路的引下线就可以完成全部的线路参数测量；解决了现有测试手段存在的测试接线倒换烦琐、抗干扰、稳定度、精度等方面存在的问题。

The external wiring is simple, measurement of all the line parameters can be achieved only by connecting the down-lead of the tested lines; the problems such as the trouble of test line switching, interference resistance, stability, accuracy and the like in the prior testing method are solved.

- **海量存储数据**

- **Large Data Storage**

仪器内部配备有日历芯片和大容量存储器，能将检测结果按时间顺序保存，随时可以查看历史记录，并可以打印输出。

The instrument is equipped with calendar chip and mass storage, with which the inspection results can be stored in time sequence, and the history records can be reviewed and print at any time.

- **科学先进的数据管理**

- **Scientific and Advanced Data Management**

仪器数据可以通过 U 盘导出，可在任意一台 PC 机上通过我公司专用软

件，查看和管理数据并可生成工作报告。

The data of the instrument can be output through a U disk, you can, on any PC, through the special software of our company, check and manage the data and generate a work report.

仪器整体外观图

Overall Layout Plan of the Instrument



图 1-1 仪器外观

Figure 1-1 Instrument Appearance

二 主要技术参数

II Main Technical Parameters

1	使用条件 Utilization Conditions	-20°C ~ 50°C -20°C to 50°C	RH<80%
2	抗干扰原理 Anti-interference Principle	变频法 Frequency variation method	
3	电 源 Power Supply	AC 220V ± 10%	频率无限制 Frequency unlimited
4	电源输出 Power Output	最大输出电压Max. output voltage	AC300V
		精 度 Accuracy	0.5%
		最大输出电流Max. output current	8A
		输出频率Output frequency	45Hz、55Hz
5	测量范围 Measurement Range	电容 Capacitance $C_x < 50 \text{ nF}$	0.01~30μF 0.01 to 30μF
		阻抗 Impedance $C_x < 100 \text{ nF}$	0.01~400 Ω 0.01 to 400 Ω
		阻抗角 Impedance angle $C_x < 200 \text{ nF}$	-180° ~ +180° -180° to +180°
6	测量分辨率 Measurement Resolution	电容 Capacitance	0.0001μF
		阻抗 Impedance	0.0001 Ω
		阻抗角 Impedance angle	0.0001°
7	测量准确度 Measurement Accuracy	电容: If Capacitance	$\geq 1\mu\text{F}$ 时, $\pm 1\%$ 读数 $\pm 0.01\mu\text{F}$; $\geq 1\mu\text{F}$, $\pm 1\%$ of the reading $\pm 0.01\mu\text{F}$ $< 1\mu\text{F}$ 时, $\pm 2\%$ 读数 $\pm 0.01\mu\text{F}$; If Capacitance $\geq 1\mu\text{F}$, $\pm 2\%$ of the reading $\pm 0.01\mu\text{F}$
		电阻: If resistance	$\geq 1 \Omega$ 时, $\pm 1\%$ 读数 $\pm 0.01 \Omega$; $\geq 1 \Omega$, $\pm 1\%$ of the reading $\pm 0.01 \Omega$; $< 1 \Omega$ 时, $\pm 2\%$ 读数 $\pm 0.01 \Omega$; If resistance $< 1 \Omega$, $\pm 2\%$ of the reading $\pm 0.01 \Omega$;
		阻抗角: Impedance angle:	$\pm 0.2^\circ$ (电压 $> 1.0\text{V}$); $\pm 0.3^\circ$ (电压: $0.2\text{V} \sim 1.0\text{V}$); $\pm 0.2^\circ$ (voltage $> 1.0\text{V}$); $\pm 0.3^\circ$ (voltage: 0.2V to 1.0V);
8	干扰电流 Interference Current	$< 40\text{A}$	
9	外型尺寸 Outline Dimensions	500 (L) × 400 (W) × 450 (H)	
10	存储器大小 Memory Size	100 组 100 groups	
11	重 量 Weight	55 Kg	

三 面板说明

III Panel Description

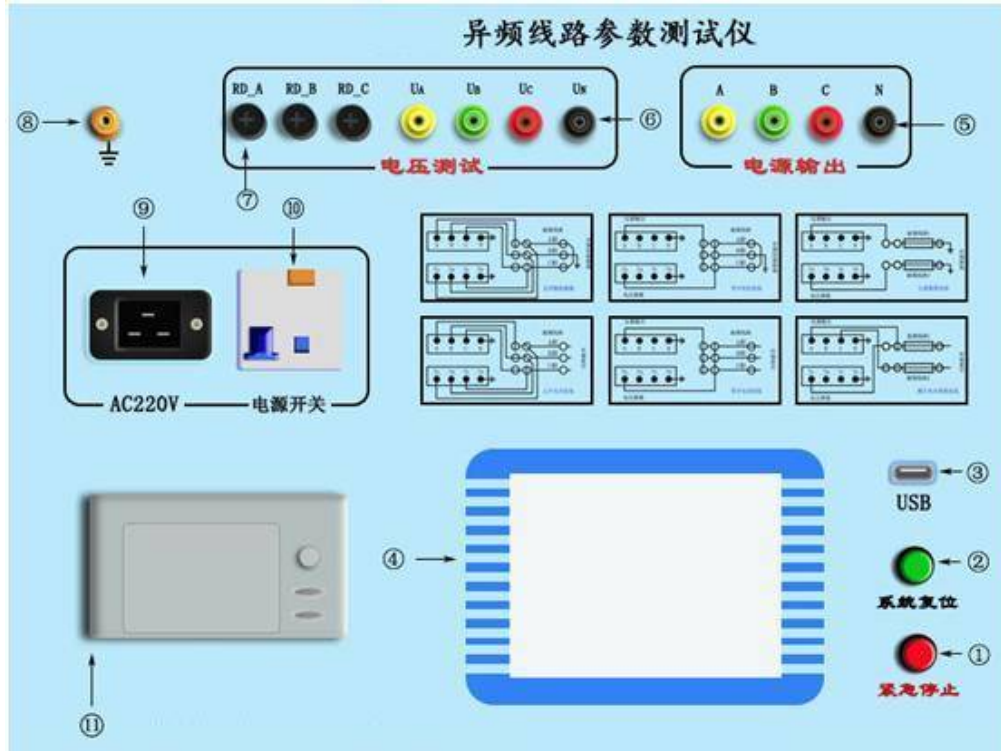


图 3-1 仪器面板指示图

Figure 3-1 Instrument Panel Indicator Diagram

- 1、 紧急停止按键
1. emergency stop button
- 2、 系统复位按键
2. system reset button
- 3、 USB 接口
3. USB interface
- 4、 液晶触摸显示屏
4. Touch-screen LCD display
- 5、 测试电源输出 (A、 B、 C、 N) 插孔 (电流测量端子)
5. Output jack of the test power (A, B, C and N) (Current Measurement Terminal)
- 6、 电压测量输入 (UA、 UB、 UC、 UN) 插孔 (电压测量端子)

6. Voltage Measurement Input Jacks (UA, UB, UC and UN)(Voltage Measurement Terminal)
- 7、 测量输入保险管
7. Input Protective tube for Measurement
- 8、 接地接线柱
8. Ground Terminal
- 9、 输入电源开关
9. Input Power Switch
- 10、 电源输入插座 (AC220)
10. Power Input Socket (AC220)
- 11、 打印机
11. Printer

3.1、紧急停止按键

3.1 Emergency Stop Button

安装位置：如图 3—1—①。

Installation location: as shown in Figure 3—1—①.

功 能：断开测试输出电源，并将外部接线全部接地；测试过程中遇到突发事件时，按此键可在不断开输入电源的情况下紧急快速地关断所有输出电源并使所有接线接地，保证使用安全；

Functions: disconnect the output power supply for the test, and ground all the external wires; in case of any sudden incidents during the test process, press this key to power off all the output power supply immediately and quickly and make all the wirings ground connected, without cutting out the input power supply, so as to ensure the utility safety;

3.2、系统复位按键

3.2 System Reset Button

安装位置：如图 3—1—②。

Installation location: as shown in Figure 3—1—②.

功 能：提供仪器内部中央处理器复位；

Function: provide reset for the central processor inside the instrument;

注 意：此复位键是复位仪器内部所有控制器件，而非直接操作输出断开，因此若测量过程中遇到紧急情况请先按紧急停止按键来快速地断开输出；

Note: this reset button can reset all the control parts in the reset instrument, instead of cutting off the operation output directly, therefore, in case of emergency during the measurement, press the emergency stop button to cut off the output immediately;

3.3、USB 接口

3.3 USB Interface

安装位置：如图 3—1—③。

Installation location: as shown in Figure 3—1—③.

功 能：U 盘插入口，把仪器内部保存的所有测量数据自动导入 U 盘中并生成文件保存，提供给用户在电脑操作系统下通过仪器附带的软件操作查看数据并生成报告文件；

Function: insert the U disk into the hole, to store all the measurement data inside the instrument automatically to the U disk and generate a file for storage, help the user to check the data through the software accompanied with the instrument and generate a report file under the computer operation system;

注 意：当 U 盘插入仪器 USB 接口并开始传输数据的时候，严禁中途拔出 U 盘，否则可能导致数据传输错误，严重的可能损毁 U 盘；

Note: when the U disk is inserted to the USB interface of the instrument to transit data, removal of the U disk midway is prohibited, otherwise, there may be data transmission error, even causing the U disk damaged;

3.4、液晶触摸显示屏

3.4 LCD Touch Screen

安装位置：如图 3—1—④。

Installation location: as shown in Figure 3—1—④.

功 能：超大屏幕中文显示每一步操作过程，用户只需在相应的地方轻轻触碰一下，即可自动完成整个测量过程；

Function: the large screen can display each operation step in Chinese characters, the user can complete the whole measuring process only by a slight touch at the corresponding position.

注 意：触摸式液晶显示屏属于精密配件，应避免长时间阳光暴晒或重物挤压和利器划伤；在操作液晶屏的时候使用铅笔头或者其它笔形塑料物件操作可以提高操作准确度；

Note: the touch LCD display is of precision component, which shall be prevented from long time sunshine exposure or being squeezed by heavy objects or scratched by a sharp object; during the operation of the LCD, pencil point or other pencil shaped plastic objects shall be applied to improve the accuracy of the operations;

3.5、测试电源输出（A、B、C、N）插孔（电流测量端子）

3.5 Output Jack of the Test Power (A, B, C and N) (Current Measurement Terminal)

安装位置：如图 3—1—⑤。

Installation location: as shown in Figure 3—1—⑤.

功 能：包含 A（黄色）、B（绿色）、C（红色）和 N（黑色）共 4 个端子，提供仪器测试输出电源；

Function: there are A (yellow), B (green), C (red) and N (black), four terminals, and the output supply for instrument test is provided;

注 意：测试过程中此输出端子有较大电流输出，严禁用手触碰端子金属部分，以防电击；

Note: the output terminal has large current output during the test, prohibit

touching the metal part of the terminal in case of electric shock.

3.6、电压测量输入 (UA、UB、UC、UN) 插孔 (电压测量端子)

3.6 Voltage Measurement Input Jacks (UA, UB, UC and UN)(Voltage Measurement Terminal)

安装位置: 如图 3—1—⑥。

Installation location: as shown in Figure 3—1—⑥.

功 能: 包含 UA (黄色)、UB (绿色)、UC (红色) 和 UN (黑色) 共 4 个端子, 提供仪器测试输入电压;

Function: there are UA (yellow), UB (green), UC (red) and UN (black), four terminals, and the output supply for instrument test is provided;

注 意: 测试过程中严禁用手触碰端子金属部分, 以防电击;

Note: prohibit touching the metal part of the terminal in case of electric shock.

3.7、测量输入保险管

3.7 Input Protective tube for Measurement

安装位置: 如图 3—1—⑦。

Installation location: as shown in Figure 3—1—⑦.

功 能: 测试过程中保护仪器本身, 防止不正常情况下通过输入端损坏仪器;

Function: the instrument can be protected during the test, to prevent the damage to the instrument through the input end under abnormal situations.

注 意: 测量过程中如出现显示器上那一相电压显示的数据不正确 (如数据乱跳动或者始终不变等), 则可能此相的保险管已经烧毁; 更换保险管时可用十字螺丝刀轻轻拧开外面的黑色护套, 然后装入新的保险管重新拧上外壳即可;

Note: if the data of the phase on the screen is incorrect during the test (such as data disorderly bouncing or constant), it may indicate the burned Protective tube of the phase; during the replacement of the Protective tube, a cross screwdriver can be used to slightly screw out the black sleeve, and then a new Protective tube is installed to

the outer casing;

3.8、接地接线柱

3.8 Ground Terminal

安装位置：如图 3—1—8。

Installation location: as shown in Figure 3—1—8.

功 能：仪器保护接地；

Function: Instrument grounding protection;

注 意：仪器内部自带接地保护装置，测试中应当保证接入可靠地网；

Note: the instrument is provided with grounding protection device itself, make sure to connect with reliable ground network during the test;

3.9、输入电源开关

3.9 Input Power Switch

安装位置：如图 3—1—9。

Installation location: as shown in Figure 3—1—9.

功 能：打开此关，仪器上电进入工作状态。关闭此开关，也同时关闭仪器内部所有电源系统，紧急情况应立即关闭此开关并拔掉输入电源线；

Function: switch on the switch to energize the instrument at working state; switch off the switch, and meanwhile, close all the power systems inside the instrument, turn off this switch and pull off the input transmission lines immediately in case of any emergency;

注 意：此开关是自带漏电保护的空气开关，当出现后端漏电的情况下此开关将自动断开，可再次检查接线后再合上开关；

Note: this switch is an air switch with electric leakage protection, in case of electric leakage at the rear end, this switch will automatically cut off, you can switch on the switch after wiring inspection;

3.10、电源输入插座（AC220）

3.10 Power Input Socket (AC220)

安装位置：如图 3—1—10。

Installation location: as shown in Figure 3—1—10.

功 能：使用标准大功率专用插座与市电或发电机相连接；

Function: use standard high-power special socket to connect with the utility power or power generator;

注 意：电源线插头是大号空调插座，一般三角插座可能插不进，可使用仪器附带的接线排插延长接线；

Note: the power plug is large air-conditioner socket, in which the ordinary triangle socket can hardly inserted, so the wiring two included in the instrument can be used to extend the wiring.

3.11、打印机

3.11 Printer

安装位置：如图 3—1—10。

Installation location: as shown in Figure 3—1—10.

功 能：显示可打印数据时，将光标移动至“打印”项按确认键打印。

Function: when the printing data is displayed, move the cursor to “Print” option, and press “Confirm” to print.

注 意：打印机为全自动热敏打印机，打印纸宽 55mm。更换打印纸时请使用热敏打印机专用打印纸，首先按下打印机下部凸起的按钮，打印机盖板将自动弹起，然后按顺序将打印纸放入打印纸仓内并留少许部分在外面，最后合上打印机盖板。

Note: the printer is of full-auto thermal printer, the width of the printing paper is normally 55 mm. the special printing paper for the thermal printer shall be used for the replacement of the printing paper, press the button protruding from the printer first, and printer cover will automatically jump up, and then put the printing paper in sequence into the cab of the printing paper, with a small part left outside, and finally close the printer cover.

四 使用说明

IV User Instructions

4.1、主菜单

4.1 Main Menu

仪器接入 AC220 电源把电源开关合上，即显示主菜单界面（如图 4—1）。九宫格式的显示，每一个项目都有一个独立的显示区域，用户只需在相应的项目上面轻轻触碰一下就可以轻松的进入下一级具体操作菜单，整个过简单明了。省去了繁琐的按键操作。

Connect the instrument with AC220, power off the power switch, the main menu interface will be displayed (as shown in Figure 4-1). With the display mode of nine boxes, each item has an independent displaying area, the user can enter the next operation menu only via a slight touch at the corresponding item. Therefore, the whole process is simple and clear, saving the bother of button-pressing operation.



图 4—1

Figure 4—1

4.2、线路设置

4.2 Line Setting

首先从主界面进入线路长度设置界面（如图 4—2）；整个设置项分上下六个模拟按键，上面三个从左至右分别增加数据的十位、个位和小数点后一位，下面三模拟按键分别对应递减；多位数据直接设置进一步简化了操作步骤，使操作更人性化、更智能化。修改中间的数据到实际线路长度后按保存即可。

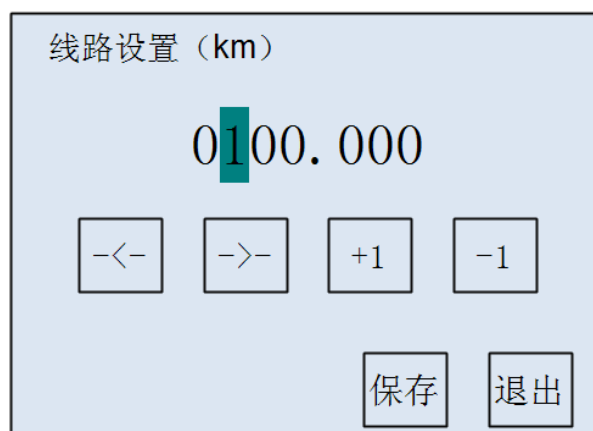


图 4—2

Figure 4—2

Enter the line length setting interface from

电话: +8621 56774665 传真: +8621 56774695

the main interface (as shown in Figure 4-2); All the setting options are arranged with 6 simulation keys on the upper and lower part. For the 3 simulation keys at the upper part, the tens, unit and the first digit after the dot are increased from left to right, as for the 3 simulation keys at the bottom part, the data are decreased accordingly and gradually. Co-setting of a quantity of data simplifies the operation steps, ensuring a more humanized and intelligent operation. The number in the middle modified can be stored for the actual length of the lines.

4.3、项目测试

4.3 Item Test

主界面（如图 4—1）九宫格显示六个测试项目一目了然，第一行从左至右分别是正序阻抗、零序阻抗和线路互感；第二行从左至右分别是正序电容、零序电容和耦合电容。用户在根据接线提示正确接好仪器外部接线的情况下，只需点一下相应的项目就能进入下一级开始测试菜单（如图 4—3），本菜单采取长按并显示进度条的形式，杜绝了操作人员无意识情况下误操作的情况发生，保障了操作人员以及仪器本身的安全。

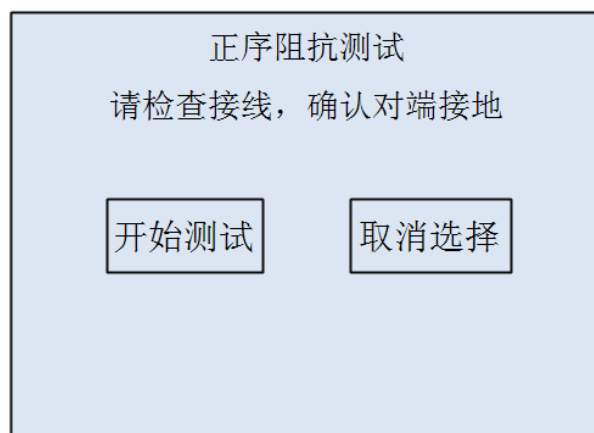


图 4—3

Figure 4 —3

Main interface (as shown in Figure 4-1), the test items shown in nine boxes are clear, positive sequence impedance, zero sequence impedance and line mutual-inductance are shown in the first line from left to right; positive sequence capacitance, zero sequence capacitance and coupling capacitance are shown in the second line from left to right. during the wiring of the external wires of the instrument in accordance with the wiring instructions, the user can enter the next start test menu by touching the corresponding item (as shown in Figure 4-3), the menu adopts long-time pressing for display of the process bar, thus the mal-operation of operators under unconscious cases are avoided, ensuring the safety of the operators and the instrument.

按住开始测试不放，当进度条跑满整个方格的时候，仪器将自动进入最后的测试过程。

Press the “start test” tightly, when the process bar fills all the boxes, the instrument is automatically enter the last test process.

为更好的保证测量精度和测量安全性，仪器首先将对外界干扰信号进行检测并分析；当然，仪器内部采用的是高端的专业 DSP 快速处理器来处理，相对用户来说整个干扰检测过程就是一瞬间的事情，用户根本不用担心此过程会占据过多的时间而导致测试过程时间过长。干扰检测完成后仪器立即启动变频输出装置；首

先变频到 55Hz 使输出端快速平缓地输出至 200 伏电压或者 4 安培电流，整个过程仪器内部均采用实时监控的手段，保证输出的稳定可靠。升压或升流成功后，保持 200 伏电压或 4 安培电流然后进行 55Hz（如图 4—4）环境下的检测分析；当 55Hz 检测分析完成后，仪器自动变频到 45Hz 进行 45Hz（如图 4—5）环境下的检测分析；最后经过仪器内部中央处理器的高精度处理，得出并显示各项测试结果及数据（如图 4—6），包括 55Hz 所有数据和 45Hz 所有数据，用户可以自行选择查看并打印。整个测试过程的所有数据均是采取的实时检测并显示的方式，用户可以很直观的观察监视整个测试过程发生的变化。

55Hz正在测试		
A :	B:	C:
V: 204.2261V	209.5397V	208.1321V
I: 000.6883A	000.7269A	000.7251A
θ : 089.7421	089.7806	089.7596

图 4—4
Figure 4—4

To ensure the measurement accuracy and measurement safety better, the instrument shall detect and analyze the external interference signal firstly; of course, the inside of the instrument is processed with high-end professional DSP quick processor, for the users, the whole interference detecting process is just a matter of one second, so the user should not concern about the long testing process due to time consumption during the detection. After the completion of interference detection, the instrument shall start the frequency variation output device timely; first, adjust the frequency to 55Hz, so as to ensure that the output end can be speedily and smoothly output to 200 V voltage or 4 A current, during the whole process, the instrument adopts real time monitoring inside, to ensure stable and reliable output. After the voltage or the current is successfully increased, keep 200V voltage or 4 A current, to conduct the detection and analysis under the condition of 55Hz (as shown in Figure 4-4); once the 55Hz detection and analysis are completed, the frequency of the instrument shall automatically change to 45Hz, so as to conduct the detection and analysis under the condition of 45Hz; finally, after the high-precision treatment by the central processor inside the instrument, various test results and data are obtained and displayed (as shown in Figure 4-5), including all data under 55Hz and 45Hz, the user can select at his option to review and print. All the data of the whole testing process are detected and displayed in real time, therefore, the user can observe and monitor the change in the whole testing process directly.

45Hz正在测试		
A:	B:	C:
V: 148.7914V	151.0587V	150.2013V
I: 000.4006A	000.4261A	000.4225A
θ : 089.7140	089.7490	089.6637

图 4—5

Figure 4-5

测试结果		
A:	B:	C:
Z: 30.4314	30.3651	30.4138
θ : 0.1942	0.1601	0.2593
I: 4.0000	4.0050	4.0099
θ = 0.2045	L= 10.000km	
Z= 30.4034 Ω	Z= 3.04034 Ω /km	
Zr= 30.4032 Ω	Zr= 3.04032 Ω /km	
Zx= 0.1085 Ω	Zx= 0.0108 Ω /km	
Lx= 0.3454mH	Lx= 0.0345mH/km	
退出	打印	55Hz
		45Hz
		结果

图 4—6

Figure 4-6

4.4、时间设置

4.4 Time Setting

从主菜单下方的“时间设置”小方格直接进入时间设置子菜单（如图 4—7）。如图所示十个模拟按键设置分别对应年、月、日和时、分、秒；上面一行对应递增调整，下面一行对应递减调整。想调整哪里就调整哪里，真正做到一步到位。用户调整完成后按保存键即可保存退出。

年+1	月+1	日+1	时+1	分+1
2013	01	01	00	00
年-1	月-1	日-1	时-1	分-1
			保存	退出

图 4—7

Figure 4—7

Enter “time setting” sub-menu via the small box “time setting” under the main menu (as shown in Figure 4-7).The simulation keys listed in the figure are respectively year, month, day, and time, minute and second; the row above is used to increase, the row below is used to decrease. Adjust to the point where you intended, really achieving the adjustment at one go. Once the adjustment is completed, the user can press “Save” to escape.

4.4、数据管理

4.4. Data Management

※ 数据查询

※ Data Query

打开仪器从主界面右下方“数据管理”方格进入到下级操作菜单（如图 4—8），点击第一项“数据查询”即可进入查询界面（如图 4—9）。从第零组到第九十九组一共一百组数据可供用户查阅；分页显示，每一页显示十个测试项目，每一组显示日期、时间和具体项目名称，用户能非常清楚了查阅自己想看的数据结果。在想查阅的数据一栏上轻轻触碰一下就能顺利的进入详细的数据结果

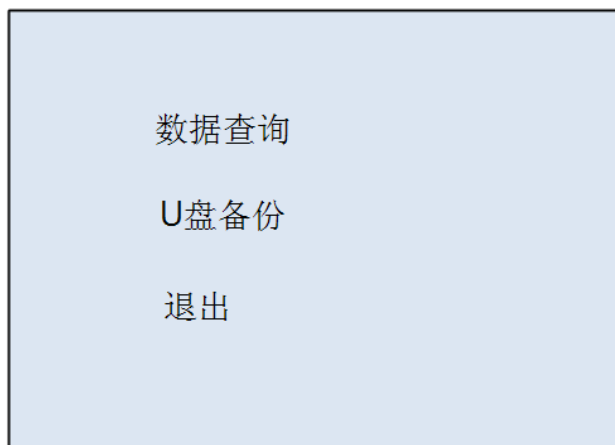


图 4—8

（如图 4—10）查看并且可以自行选择打印。

Figure 4—8

Start the instrument and enter into the sub-operation menu from the “Data Management” square box at the lower right of the main interface (Figure 4-8), and click the first item “Data Query” to enter into the query interface (Figure 4-9). There is 100 sets (from set 0 to 99) of data for users to check; 10 test items shall be displayed at each page, and the data, time and specific item name shall be displayed for each set of item, and the user can clearly check the desired data results. The detailed data results (Figure 4-10) can be smoothly checked through tightly touching on the data column to be checked and printed.

日期	时间	项目	
00	20130101 00:00	0010km 正序阻抗	上页
01	20130101 00:00	0010km 零序阻抗	
02	20130101 00:00	0010km 正序电容	下页
03	20130101 00:00	0010km 零序电容	
04	20130101 00:00	0010km 线路互感	退出
05	20130101 00:00	0010km 耦合电容	
06	20130101 00:00	0010km 正序阻抗	
07	20130101 00:00	0010km 零序阻抗	
08	20130101 00:00	0010km 正序电容	
09	20130101 00:00	0010km 零序电容	

图 4—9

Figure 4—9

测试结果		
A:	B:	C:
Z: 30.4314	30.3651	30.4138
θ : 0.1942	0.1601	0.2593
l: 4.0000	4.0050	4.0099
$\theta = 0.2045$	L= 10.000km	
Z= 30.4034 Ω	Z= 3.04034 Ω /km	
Zr= 30.4032 Ω	Zr= 3.04032 Ω /km	
Zx= 0.1085 Ω	Zx= 0.0108 Ω /km	
Lx= 0.3454mH	Lx= 0.0345mH/km	
退出	打印	55Hz
		45Hz
		结果

图 4—10

Figure 4—10

※ U 盘备份

※ U Disk Backup

进入“数据管理”选项后，可一看到如图 4—8 显示界面，用户轻轻按下

“U 盘备份”那一栏保持两到三秒钟的样子，即可进入 U 盘操作界（如图 4—11）。

The interface displayed in Figure 4-8 can be seen after entering into the “Data Management” option, and the user can enter the U disk operation interface (Figure 4-11) through tightly pressing the “U Disk Backup” column for 3 seconds.

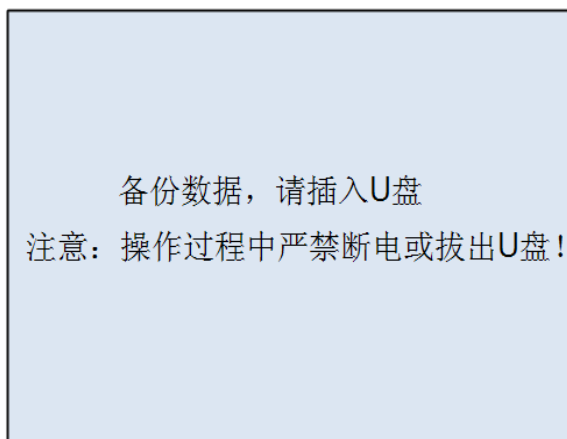


图 4—11

Figure 4—11

按照屏幕上的提示，用户只需把 U 盘插入仪器面板右下方的 USB 插口即可出现数据传输的界面（如图 4—12）一共传递了

多少组数据一目了然，非常方便。用户需要特别注意的是，在此过程中 U 盘是处在高速读写状态，是不允许中途拔出 U 盘或者仪器断电的情况的，严重的话可以导致 U 盘烧毁。等到数据传输完毕，显示器上出现“请拔出 U 盘”的提示信息（如图 4—13）后才可以拔出 U 盘。

The user can conveniently check the for data transmission interface (Figure 4-12) and the total set number of the transmitted data through inserting the U disk into the USB socket at the lower right of the instrument panel in according with prompts on the screen. The user shall specially note that the U disk shall be at high-speed read and write state in the process, halfway-unplugging of U disk or instrument outage shall not be allowed, the U disk would be burned in severe cases. The U disk can be unplugged after the data is transmitted and the prompting message (Figure 4-13) of “Please unplug U disk” on the display.



图 4—12

Figure 4-13

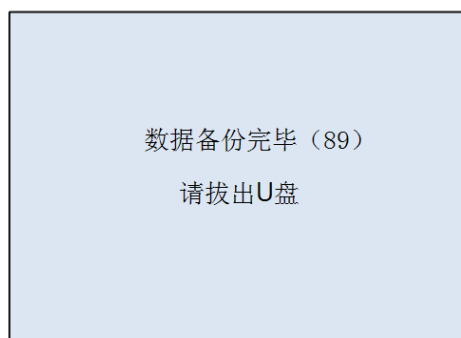


图 4—13

Figure 4-13

五 参考接线

V Reference Wiring

测试开始前，将测量端的线路引下线可靠接入大地，并将面板左上角的仪器接地端子可靠接入大地，然后分别将电源输出信号地 N 和电压输出信号地 UN 分别可靠接入大地，将测试电源输出端子 A、B、C 连接到线路测量引下线仪器电源侧，最后将电压测量端子 UA、UB、UC 接入线路引下线线路侧，仪器测试接线完成后，再打开线路引下线的接地，以保证设备和操作人员的安全。

Before test, reliably ground the line down leads at the measurement end, the instrument grounding terminal at the upper left and the panel, and the power output signal ground N and voltage output signal ground UN respectively, and finally connect the test power output terminals A, B and C at the power side of the line down lead instrument, and activate the grounding of the line down leads after the test wiring is completed, so as to ensure safety of the equipment and operating personnel.

5.1、正序阻抗接线（如下图），零序阻抗也可采用此种接线方法接线，仪器内部会自动在内部切换接线。

5.1 Positive-sequence impedance wiring (as shown in the figure below). The zero-sequence impedance also can be wired with this method, and the instrument wiring can be automatically switched inside.

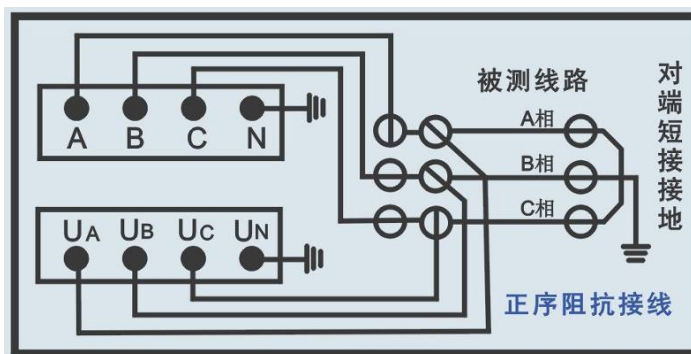
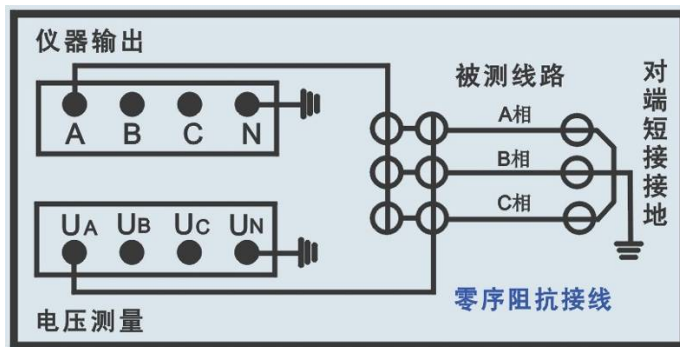


图 5—1、正序阻抗接线

Figure 5-1 Positive-sequence Impedance Wiring

5.2、零序阻抗接线图（如下图）

5.2 Zero-sequence impedance wiring diagram (as shown in the figure below)



5.3、线路互感接线（如下图）

5.2 Line mutual-inductance wiring (as shown in the figure below)

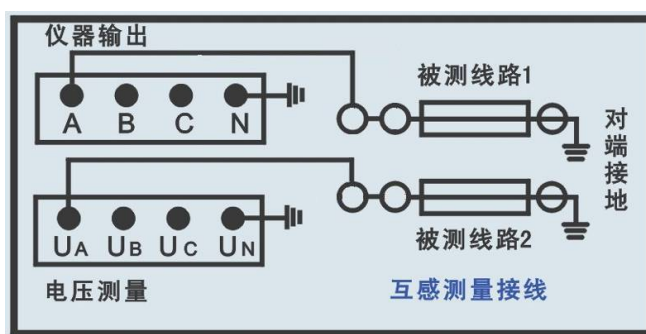


图 5—3、线路互感接线

Figure 5-3 Line Mutual-inductance Wiring

5.4、正序电容接线（如下图），零序阻抗也可采用此种接线方法接线，仪器内部会自动在内部切换接线。

5.4 Positive-sequence capacitance wiring (as shown in the figure below). The zero-sequence impedance also can be wired with this method, and the instrument wiring can be automatically switched inside.

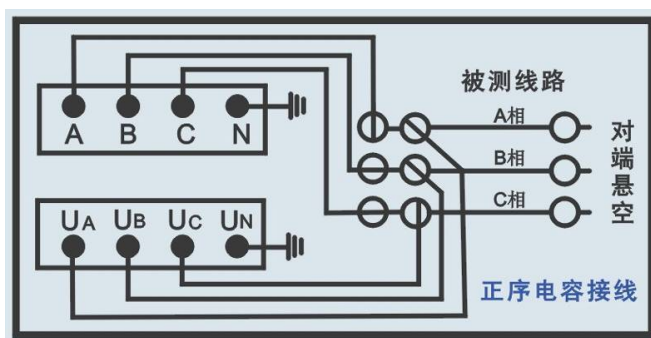


图 5—4、正序电容接线

Figure 5-4 Positive-sequence Capacitance Wiring

5.5、零序电容接线（如下图）

5.5 Zero-sequence capacitance wiring (as shown in the figure below)

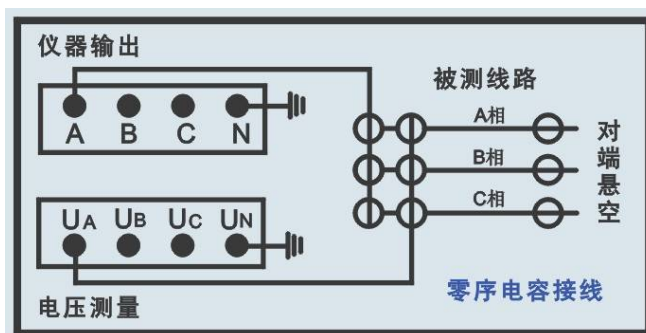


图 5—5、零序电容接线

Figure 5-5 Zero-sequence Capacitance Wiring

5.6、耦合电容接线（如下图）

5.6 Coupling capacitance wiring (as shown in the figure below)

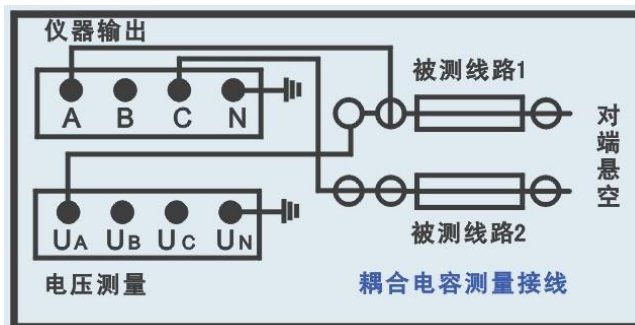


图 5—6、耦合电容接线

Figure 5-6 Coupling Capacitance Wiring

仪器测试采用四极法原理，被测线路需要电流引下线 3 根，电压引下线 3 根，电流测试线位于测试电源侧，电压引下线位于线路侧，以消除测量端的测试线和接触电阻的影响。如果测试引下线只引出 3 个端子，尽量用截面积足够大的导线，并保证与线路测量端可靠连接，避免引入较大的接线误差。

The instrument test adopts four-electrode method principle, 3 current down leads and 3 voltage down leads are required in the tested line, the current testing lines are positioned at the test power side and the voltage down leads are arranged at the line side to eliminate impacts of the tested wire at the measurement side and the contact resistor. If the tested down lead only leads out 3 terminals, adopt the wires with larger cross-sectional area as possible, and ensure reliable connection to line measurement end to avoid introducing larger wiring error.

仪器测试接线极为简捷，只需一次接入上述测试线，通过仪器自动控制测量方式和被测线路对端接线方式配合，即可完成所有序参数测量，大大提高测试效率和操作安全性。

The instrument test wiring is very simple, and measurement of all order parameters can be completed only through connecting the above tested wires once and combining methods of automatic-instrument control of measurement and end-to-end wiring of tested lines, thereby greatly improving test efficiency and operation safety.

仪器内部已经将 N、UN、左上角的仪器接地端等三个柱子可靠连接，现场接线时可以只连接左上角的仪器接地端到大地就可以了。

The 3 posts of N, UN and instrument ground terminal at the upper left are reliably grounded in the instrument, and only the instrument ground terminals at the upper left shall be grounded for field wiring.

连接仪器和被测线路时，保证线路测量端可靠接地（挂接地线），测试完成后恢复，取接地线；仪器可靠接大地，注意各个测试信号接地线要按照接线指示图完成。

When connecting the instrument and the test lines, ensure reliable grounding (hang and connect ground wires) of the line measurement end, restore after the test is completed, and take ground wires; reliably ground the instrument, and it shall be noted that all test signal ground wires shall be grounded as per the wiring indicator diagram.

在雷雨天气或者沿线路有雷雨天气时，不能进行测量，以保证人员和设备安全。

Do not measure in stormy days along the line to ensure personnel and equipment safety.

六 PC 机软件说明

VI PC Software Description

本软件由仪器出厂时存储于 U 盘根目录下。

The software is stored in root directory of U disk at ex-works of the instrument.

主要功能：

Main functions:

- 1、导入仪器测试数据文件；
1. Import instrument test data files;
- 2、显示详细数据，可供用户自行选择；
2. Display detailed data for user to choose;
- 3、选取相应的测试项目，生成标准报告文件；
3. Select appropriate test items and generate standard report file;
- 4、生成单个项目详细数据报告文件；
4. Generate detailed data report files of individual items;

6.1、软件主界面

6.1 Software Main Interface



(无数据)

(Without data)



(有数据)

(With data)

软件主界面分四大块：

The software main interface is divided into 4 blocks:

1，导入数据显示区；

1. Imported data display area

显示所有导入的测试项目标题，包括有时间、线路长度和测试项目名称，用户能清楚地找到自己所需要的项目，然后添加到右边区域并显示，最多能同时添加四个测试项目。

Display titles of all imported test items, including time, line length, and test item name. Users can clearly find the required items, and then add the items into the right

area to display, and can simultaneously add 4 test items at most.

2, 选中项目显示区;

2. Selected item display area

此区域最多能同时添加四个测试项目, 如需要添加其它测试项目请先点击下方删除单项数据或清空单项列表, 然后再另行添加。

4 test items can be simultaneously added in the area at most. In case of adding other test items, first click the lower part to delete individual data or clear individual list, and then add other items.

3, 项目详细数据显示区;

3. Detailed item data display area

此区域又分为四个小表格; 第一个表格为基本信息栏, 显示一些基本测量条件供用户自行填写, 以便生成报告文件的时候一起写入报告中保存。第二个表格为测试过程中 45Hz 和 55Hz 详细数据。第三个表格为每一相的测试结果数据。第四个表格为总结果以及每公里换算值。

This area is divided into 4 small tables; the first table is the basic information column and shows some basic measurement conditions for user to complete so as to fill in the report for storage when the report file is generated. The second table shows the detailed 45Hz and 55Hz data in the test process. The third table shows the test results of each item. The forth table displays total results and conversion value per kilometer.

4, 功能按键选择区;

4. Function key selection area

此区域共七个键从左至右分别为导入数据、添加、生成标准报告、单项数据报表、删除单项数据、清空数据列表和推出系统。

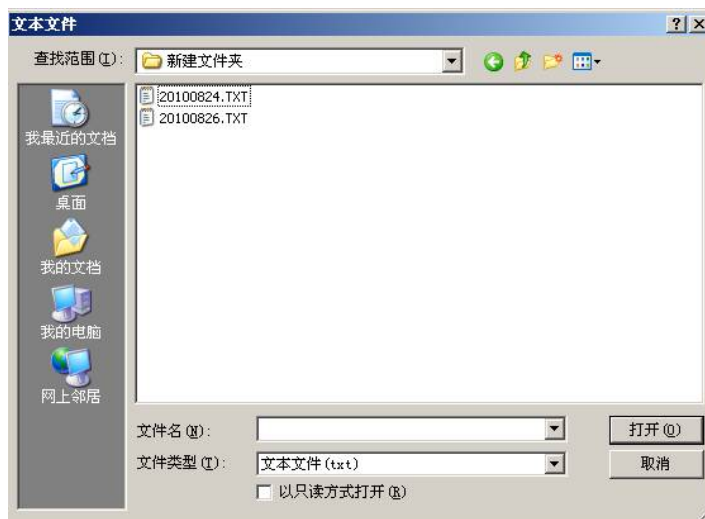
There are 7 keys in this area from left to right, namely, import data, add, generate standard report, individual data report, delete individual data, clear data list, and exit system.

6.2、数据导入

6.2. Data Importing

点击导入数据按键, 在弹出的对话框中选择数据文件。

Click the "Import Data" key, and select data file in the pop-out dialogue box.



6.3、基本信息填写

6.3. Basic Information Filling

因为报告文件中需要一些做试验时的环境参数，所以在右边的基本信息栏中提供一些可供用户自行填写的空白区域，当这些参数在软件中填写好之后，那么生成的报告文件中就会自动添加；如果在软件中没有填写，那么报告中相应的选项也为空。

Because some test environment parameters are required in the report file, the blank space shall be left in the right basic information column for the user to fill voluntarily. When the parameters are filled in the software, the generated report file will be automatically added; if not, the appropriate options in the report are also empty.

附录 A：随机配件

Appendix A: Accessories Included

序号 SN	名 称 Name	数量 Quantity
1	仪器主机 Instrument host	1台 1 set
2	附件箱 Accessory kit	1个 1pc
2	测试输出线 Test output line	3根 3pcs
3	电压输入线 Voltage input line	3根 3pcs
4	地线 Ground wire	1根 1pc
5	AC220V电源线 AC220V power line	1根 1pc
6	使用说明书 User Instructions	1份 1pc
7	出厂合格证 Ex-factory certificate	1份 1 pc
8	保险管 Protective tube	3个 3 pcs
9	打印纸 Printing paper	1卷 1 volume
10	U盘 U disk	1个 1pc

注 意：具体随机配件视出货型号和地区的差异可能有所不同。

Note: the specific accessories included may vary depending on shipment models.

电话：+8621 56774665 传真：+8621 56774695

附录 B

工频参数测量试验报告

试验日期:_____

报告日期:_____

(一) 铭牌参数

位置	线路型号	地线型号	长度(km)

(二) 线路参数理论计算值 (架空线路部分)

正序阻抗 (Ω)	
零序阻抗 (Ω)	

(三) 现场干扰测量

感应电压			
测量结果 (相对地感应电压)	A	B	C

(四) 阻抗测量:

试验仪器:	仪器名称	型号	编号	生产厂家	技术参数
	异频线路参数测试仪	LYCS8800	18#	上海来扬	0-250V 0-5A
试验环境:	环温: _____ 湿度: _____				
正序阻抗测量 (全长: _____ KM) +j					
	正序阻抗 (Ω)	正序电阻 (Ω)	正序电抗 (Ω)	正序电感 (H)	
全长测量值					
每KM换算值					
零序阻抗测量 (全长: _____ KM) +j					
	零序阻抗 (Ω)	零序电阻 (Ω)	零序电抗 (Ω)	零序电感 (H)	
全长测量值					
每KM换算值					
正序电容测量 (全长: _____ KM) +j					
	正序阻抗 (Ω)	正序电阻 (Ω)	正序容抗 (Ω)	正序电容 (H)	
全长测量值					
每KM换算值					
零序电容测量 (全长: _____ KM) +j					
	零序阻抗 (Ω)	零序电阻 (Ω)	零序容抗 (Ω)	零序电容 (H)	
全长测量值					
每KM换算值					

(五) 试验结论及分析

批准:

复审:

初审:

试验:

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