

LNL-100A

Loop Resistance Tester

User Manual

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1.Product Overview

The operation panel of LNL-100A Loop Resistance Tester adopts an ergonomic design that conforms to operating habits. It adopts high-frequency switching power supply and digital circuit technology, and is suitable for measuring the circuit resistance of switch control equipment. The testing current adopts the DC 100A recommended by the national standard. The circuit resistance can be directly measured at a DC of 100A, and the test results are displayed on a large LCD screen with functions such as data storage, output printing, and time setting. There is also a 50A gear available for users to choose from; Customized testing time, with a maximum set time of 599s, which is much longer than the standard requirement of 60s; It is the only one in China that can reach 0.01 μ The contact resistance tester with Ω resolution and very stable performance surpasses the imported high current micro ohmmeter. Meet the requirements of on-site high-voltage switch maintenance and high-voltage switch factory circuit resistance testing by the power and power supply departments.

2.Application

Suitable for high-precision measurement of contact (circuit) resistance of high and low voltage switches and DC resistance of cable lines, as well as other occasions that require high current and micro resistance measurement.

3.Executive Standards

No.	Standard Name
1	DL/T845.4-2004 General Technical Conditions for Resistance Measurement Devices: Circuit Resistance Testers
2	DL/T596-1996 Preventive Testing Regulations for Electric Power Equipment
3	SD301-88 Regulations for Handover and Preventive Testing of AC 500kV Electrical Equipment
4	JJG1052-2009 Verification Regulations for Circuit Resistance Testers and Direct Resistance Meters
5	DL/T967-2005 Verification Regulations for Loop Resistance Testers and DC Resistance Rapid Testers

4. Performance Characteristics

(1)High current: Adopting the latest switch power supply technology, it can continuously output high current for a long time, overcoming the drawbacks of instantaneous current in pulse power supply, effectively breaking through the oxide film on switch contacts, and obtaining good test results.

(2)High stability: Under severe interference conditions, the last digit of the LCD screen can be stable within ± 1 word range, with stable readings and good repeatability.

(3)High precision: Adopting dual high-speed 16 bit $\Sigma - \Delta$ AD sampling, the latest digital signal processing technology, with a maximum resolution of $0.01 \mu \Omega$ is currently the only one in China that can reach $0.01 \mu \Omega$. The contact resistance tester with Ω resolution and very stable performance surpasses the imported high current micro ohmmeter.

(4)Intelligence: Imported high-performance CPU, the system automatically switches range based on signal size during measurement, ensuring testing accuracy. The over temperature protection circuit can automatically stop outputting current when the instrument exceeds the set temperature, ensuring the safe use of the instrument.

(5)High quality: All key components are made of imported components, and the impact of environmental temperature on measurement results is

effectively eliminated through cleverly designed temperature compensation circuits. The use of military connectors enhances vibration resistance.

(6)Powerful function: The current flow can be freely selected between 50A and 100A, and the testing time can be arbitrarily set within 5s to 599s, overcoming the shortcomings of other similar instruments that cannot set the measurement time or have a short continuous working time, far exceeding the performance of other similar instruments.

(7)Easy to use: Small size, light weight, and easy to carry.

5. Technical Index

(1).Measurement range: 0-2999.9 $\mu\Omega$

(2).Resolution:0~99.99 0.01 $\mu\Omega$

100.0~2999.9 0.1 $\mu\Omega$

(3).Test flow: DC50A, 100A fixed output in two gears

(4). Measurement accuracy: $\pm (0.5\% \text{rd} + 2\text{d})$

(5). Continuous working time: 5s~599s

(6). Display method: Large screen Chinese LCD display

(7). Working power supply: AC220V \pm 10% 50Hz

(8). Overall power: 600W

(9).Maximum storage records: 100

(10). Working environment: Temperature -10 °C~40 °C Humidity \leq
80% RH

(11). Volume: 430 \times 275 \times 230 mm

(12).Mass: 7kg (excluding accessories)

6.Panel Structure

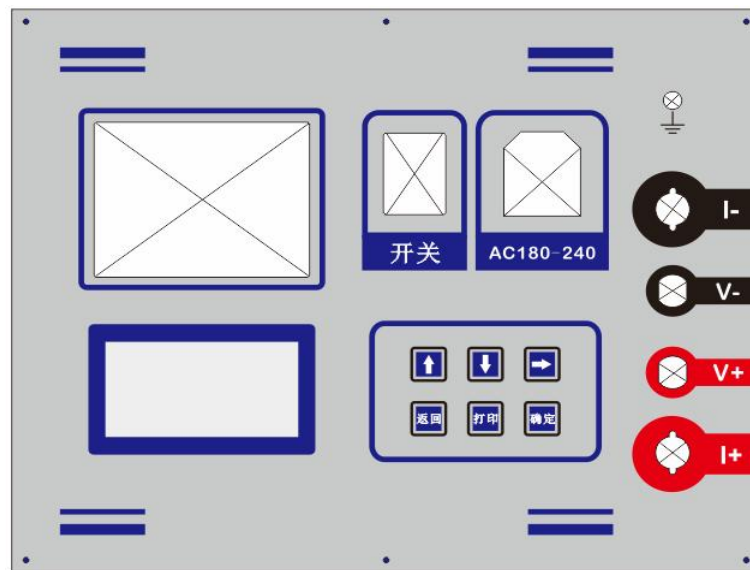


Figure 1 --- Panel Structure Diagram

7.Working Principle

This instrument adopts the current voltage method testing principle, also known as the four wire method testing technology. The schematic block diagram is shown in Figure 2.

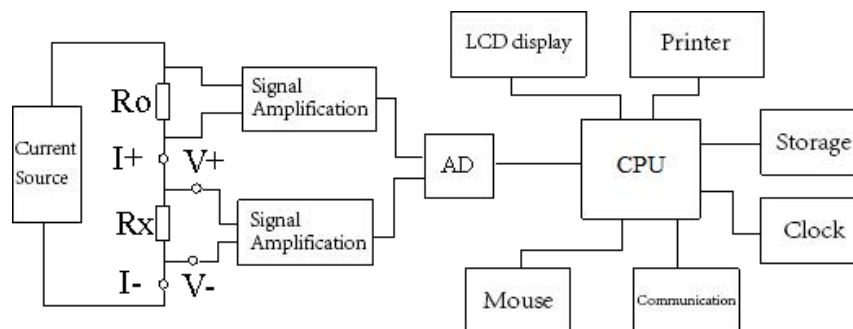


Figure 2 --- Testing Principle Diagram

The current source outputs a constant current that flows through the standard resistor R_0 and the measured resistor R_x . The voltage signal U_0

on the sampling standard resistor R_0 is filtered and amplified before being sent to AD for conversion into a digital quantity, and then the current value I is calculated, as shown in formula (1). Similarly, the voltage signal U_x on the resistance R_x to be measured is sampled, filtered, and amplified in multiple stages before being sent to AD for conversion into a digital quantity. The resistance value R_x is calculated using formula (2).

$$I = \frac{U_0}{R_0} \quad (1)$$

$$R_x = \frac{U_x}{I} \quad (2)$$

8.Operation Method

(1). LCD display instructions

This instrument adopts 128×64 high-resolution gray backlit LCD display screen, which can display clearly even in strong sunlight. The parameter settings and test results are displayed on the LCD screen. Full Chinese character operation interface, clear graphics, beautiful appearance, and easy to operate.

(2). Correct wiring

Connect the wires correctly according to the wiring method shown

in Figure 3.

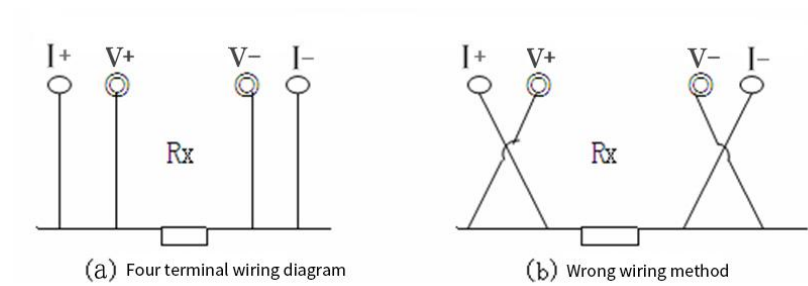


Figure 3 --- Four Terminal Wiring Diagram

Attention:

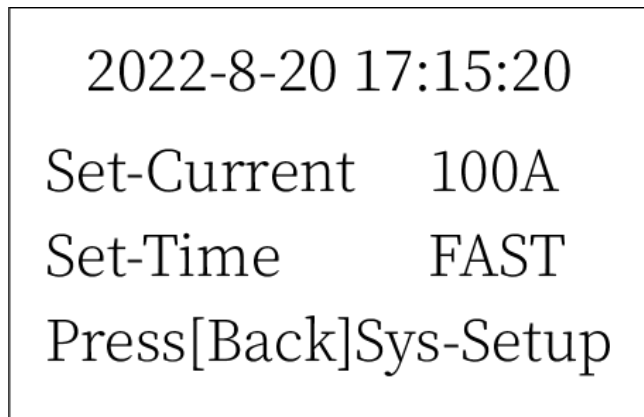
- ① The connection between the instrument panel and the testing line should be tightened and there should be no looseness.
- ② Connect according to the four terminal method, where the current wire is clamped on the outer side of the test object and the voltage wire is clamped on the inner side of the test object. The current and voltage must be of the same polarity.

(3). Power on

After confirming the wiring of the test line is correct, connect the 220V AC power supply, close the power switch, and the instrument enters the power on state. When turning on, the buzzer sounds briefly to indicate that the system is turned on.

(4). Main interface

Turn on the power switch and the system will enter the main interface, as shown in Figure 4.

A rectangular display box containing the following text:

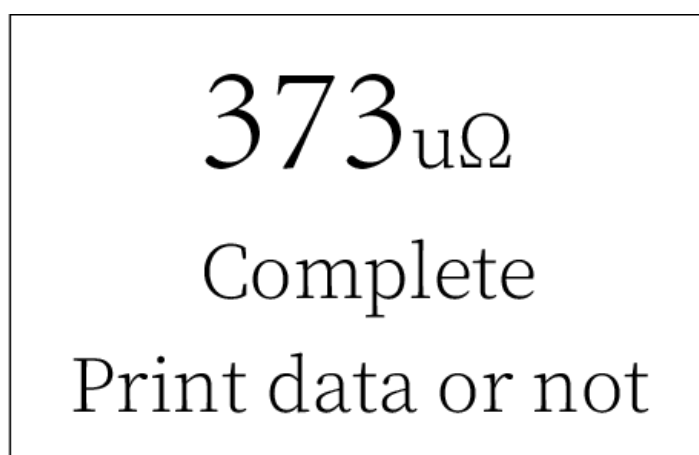
2022-8-20 17:15:20
Set-Current 100A
Set-Time FAST
Press[Back]Sys-Setup

Figure --- 4 Main Interface

Firstly, select the test current and press the up and down keys to select 50A or 100A. Press the OK key to enter the test time selection, or press the Return key to select the default test time. After selecting the test time, press the OK key to start the test.

(5). Test menu boundary

The instrument enters the testing interface, as shown in Figure 5.

A rectangular display box containing the following text:

373_{uΩ}
Complete
Print data or not

Figure 5 --- Test Interface

When the countdown test time returns to zero, the test result interface will automatically pop up. You can press the print button to print the data, and the system will automatically turn off the current output.

9. Fault Symptoms and Troubleshooting

Fault phenomenon	Troubleshooting
No response after startup, no display on the LCD screen	Check for AC power supply
	Check the power cable
	Check if the safety tube inside
During testing, the resistance value is significantly too high or displayed as out of range	Check if the measured resistance value is too high
	Check if the voltage input line is connected to the inner side
	Check if the polarity of the test line is reversed
	Check if the voltage output line is properly connected and if the tested component connector is oxidized
	Check if the tested object is closed
	Check if all ports of the test

	line have good contact when the multimeter beeps
--	--

10.Note

- (1). Please read the instruction manual carefully before using the instrument.
- (2). Please follow the correct wiring method in the manual for wiring.
- (3). This instrument shall not test the circuit resistance in a live circuit.
- (4). The instrument must be reliably grounded during use.
- (5). Do not replace the current line arbitrarily.
- (6). When the instrument is not in use, it should be stored in a ventilated, dry, cool, and clean place, paying attention to moisture-proof and corrosion-resistant gases.

11.Packing List

Name	Quantity
Host	1pcs
Special Testing Lines	1set
Ground Wire	1set
AC 220V power cord	1pcs
fuse tube	3pcs

User Manual	1pcs
printing paper	1roll
Delivery Inspection Report	1pcs
Certificate of conformity	1pcs

Appendix 1: Basic Knowledge of Contact (Loop) Resistance

(1).What is contact resistance?

Contact resistance is the additional resistance that occurs when the static contact and the moving contact come into contact with each other.

(2). What are the components of the contact resistance of a circuit breaker?

It consists of two parts: the contraction resistance and surface resistance of the contact part of the dynamic and static contacts.

(3). Why is the contact resistance of the circuit breaker unqualified?

- When breaking a large short-circuit current, the contact is burnt out.
- Due to poor adjustment and fixation of the mechanism, the stroke changes. When the overtravel is severely unqualified, it can cause changes in contact pressure or contact area.

After the debugging and installation of the circuit breaker, it has not been put into operation for a long time, causing oxidation on the surface of the moving and stationary contacts, and increasing the contact surface resistance.

Long term operation causes deformation of the spring, resulting in a decrease in contact pressure.

- Mechanical wear caused by long-term operation of the mechanical part.

For low oil circuit breakers, it is also possible that the insulation oil may react acidic and corrode the contact surface due to an unqualified acid value. Floating impurities in the oil, as well as residual carbon or metal powder particles between the moving and stationary contacts due to the interruption of short-circuit current, increase the contact resistance.

(4). What factors affect contact resistance?

- Material properties: hardness, chemical properties, mechanical strength and electrical resistivity of metal compounds.
- Contact form: point contact, line contact, surface contact.
- Contact surface condition: When an oxide film is formed on the contact surface (except for silver), the resistance of the oxide film is much higher than that of the metal itself.
- Contact pressure.
- Roughness of the contact surface.

**Appendix 2: Standard reference values for conductive contact
(circuit) resistance of circuit breakers**

Model No.	Resistance of each	Model No.	Resistance of each
SN1-10	<95	DW1-60G	200
SN2-10G	75	SW1-110	700
SN4-10	50~60	SW2-110I	180
SN4-20	50~60	SW3-110	160
SN4-10G	20	SW4-110	300
SN4-20G	20	SW6-110	180~220
SN5-10	100	SW2-220	400
SN6-10	80	SW4-220	600
SN10-35	<75	SW6-220	<400
DW1-35	550	SW7-220	<190
DW1-60	500	KW1-220	400
DW3-110	1100~1300	KW2-220	170
DW2-110	800	KW3-220	110
KW1-110	150	KW4-220	130
KW3-110	45	DW2-220	1520
KV4-110A	60	DW3-220	1200
DW3-110G	1600~1800	SW6-330	>600