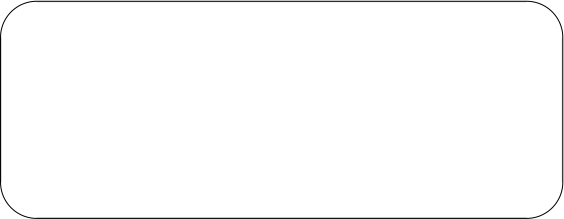


Meiruike Instrument Manual





RK7500Y Series

Programe Medical

Leakage Current

RK7500Y Series Programe Medical Leakage Current Tester

SHENZHEN MEIRUIKE ELECTRONIC TECHNOLOGY CO.,LTD



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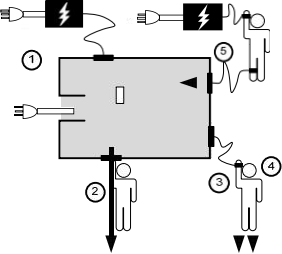
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Introduce

Overview

High quality electrical products will be tested many projects safety specification, include insulation impedance test, compression test, the grounding impedance test and leakage current contact (current) test, the test project of leakage current (current) contact test is cumbersome and important, mainly used to test electrical products under the condition of normal or fault of leakage current, To ensure the product leakage current conforms to certain international standards or regulations, and maintain the personal safety of operators.

Leakage current testing mainly includes three different modes. The first two are ground leakage current and surface leakage current, which are generally applied to products with grounded metal enclosures. The third is component leakage current testing, which is mostly applied to medical equipment. The tests mentioned above are based on the premise that the product can be used safely and will not cause harm .

RK7500Y series is a tester for measuring leakage current of medical electrical equipment. Can be

implemented in accordance with GB9706 . 1-2020 standard and GB4793. 1-2007 requirements of the

measurement.

**Leakage** **current** **mode**







The current flowing into the earth through the ground protection wire of a Class I device



An electric current flowing through the body through an ungrounded enclosure



The electrical current that flows through the application part of the device connected to the human body



Current that flows through the body by applying a partial connection while the device is in fault mode



Current that flows through the body by applying a partial connection while the device is in fault mode



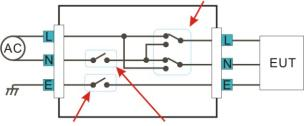
An electric current flowing through the body through connections between applied parts.

Measuring principl

Leakage current refers to the electrical insulation between metal parts, or live parts and ground parts in the absence of fault applied voltage

The current formed through the surrounding medium or insulating surface is called leakage current. The measurement of leakage current requires measurement under normal and single fault conditions of EUT power supply, and its maximum value is taken as the leakage current. So there are several power supply states as follows.

Power polarity switch



Protective ground switch Zero line switch

The so-called single fault state is:

1. Not connected protective ground wire (not suitable for grounding leakage current test)

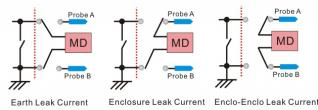
2. One line of the power supply is disconnected (zero line of the power supply)

3. External equipment failure (Patient leakage current II, Patient leakage current III will occur)

Generally speaking, we will also require switching the polarity of the power supply to measure the leakage current of the equipment under test. Therefore, this state should also be taken into account in the work of the power source.

Measuring way By switching the power state of the object to be measured and matching the position of the

test pen at both ends of the MD, leakage current in different modes can be measured.



Measurement of the network In order to measure the leakage current (or contact current) of electrical equipment,

a circuit network that can mimic the human body (human analog impedance network: MD) is requiredOr Network). Human impedance varies depending on the location, area, and current direction of the contact point. Therefore, the choice of gauge for human impedance analog circuit must be based on what kind of test to be done and the maximum leakage current allowed. Therefore, the human body simulation circuit is different according to different safety standards. They also adapt to different test ranges. You can look from various criteria. According to the safety regulations, the analog impedance network must be composed of RC equivalent circuits. This machine is equipped with

the above two networks, please see the appendix for details

What is a single failure state?

It indicates that the security protection measures of the device are faulty or the fault that may lead to a critical state occurs. The leakage current test includes the following three single fault states.

1, ground line broken (not applicable to the ground leakage current current test)

2. A wire in the power cord is broken (neutral power cord)

3. External equipment damage ( Patient leakage current II and Patient leakage III)



The main features



Built-in two kinds of measurement network, suitable for GB9706.1-2020 standard and GB4793.1-2007 standard or regulations of human body simulation measurement network

Multiple leakage current measurement modes

( 1 ) Leakage current to ground

( 2 ) Leakage current of shell

( 3 ) The application of partial grid supply voltage leakage current

( 4 ) Patient, patient's auxiliary leakage current AC

( 5 ) Patient, patient's auxiliary leakage current DC

Type of leakage current

DC 、AC





This chapter describes some of the checks you must make when you receive the instrument, and the conditions you must know and have before installing and using the instrument.

1.1 

Always follow the following rules when using the instrument:

■ 

To prevent combustion or explosion, do not use the instrument near alcohol, diluents, and other combustible materials or in air with high concentrations of these gases.

■

Do not place the instrument in a place where heat or temperature changes violently. Temperature range: 5℃ to +35℃

Instrument storage temperature range; - 20 ℃ to + 60 ℃

■

■

Do not use the instrument in an environment with corrosive gases such as sulfuric acid, fog, dirt and dust, or the like. This can corrode wires and connectors,creating hazards or connection defects that can lead to failure, failure or even fire

■

The instrument has a forced air cooling system. Provide enough space for side and back vents to allow air to circulate.

■

If the instrument is placed on an uneven surface or shaken, it may slip and damage the instrument. ■ 

When the instrument is used in places with strong magnetic or electric fields, the electromagnetic pulse may cause the instrument to malfunction and cause fire.

■ 

If the equipment is used in the vicinity of the instrument, the noise generated by the breakdown of the component under test may affect the equipment. A bove the test voltage of 3 kV, the electric field between the test lines will ionize the air and generate corona, which will generate a large amount of RF bandwidth interference between the test lines . To minimize this effect, make sure the test lines are far enough apart .

A lso, keep the test line away from conductive surfaces (especially sharp metal ends).

1.2 

When moving or transporting the instrument, take the following precautions:

■ 

Moving with the power switch on can cause shock and damage.

■ 

Moving the instrument without disconnecting the cable may result in damage to the connecting cable or dropping the instrument during removal.

1.3 

T he power cord is supplied with the instrument .





1. Make sure the power supply is within the line power supply range of the instrument.

2. 2. Determine the nominal value of the instrument fuse. The fuse box is installed in the correct position (power supply).

3. 3. Make sure the power switch of the instrument is off.

4. Connect the AC power cable to the AC LINE end on the rear panel.

5. Use the supplied AC power cable or the AC power cable selected by a qualified professional.

6. Plug into the AC power socket. 1.4



warning：Ensure that the instrument is connected to electrical ground (safe, ground).

If the grounding of the power outlet is not connected to the ground of a peripheral device or a nearby commercial wire, and the instrument is not directly connected to the ground, the housing of the instrument may carry very high voltage, which can become very dangerous.

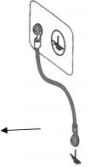


Choose at least one of the following two available methods for grounding:

1. The power cable is connected to a single- phase three-wire power socket. Make sure the socket ground wire is reliably connected

To the earth.

2. Pass the rear panel protection terminal through the ground bar (the copper supplied with the production line to reliably connect the earth

Wire or copper bar) to the earth. Let a specialized engineer select, manufacture, and install the grounding connection

Wiring. To ensure that the ground connection is correct and reliable.

1 . 5 Safe place

 ： After turning off the power switch, wait a few seconds to turn it on again. Repetitive switching of the power on/off at insufficiently frequent intervals is damaging to the instrument.

1 . 6 Safe operation

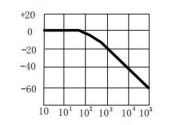
1. The instrument must be well grounded.

2, the operator must be familiar with the use of the instrument and familiar with GB9706.1 and operate the instrument according to the operating procedures.

3, in the process of testing is not allowed to touch the test and connected objects.

4. Press "STOP" to stop or turn off the power switch if any abnormality is found.

5, in order to ensure the stability of the test voltage, it is recommended that users use the AC stabilizer matching with the capacity of the instrument.



Z

R2



1、 Summarize

RK7500Y series program controlled leakage current tester is mainly used for medical equipment leakage current or laboratory standard equipment leakage current detection, the instrument tests various types (class I, class II, internal power supply and type B, BF, CF) of medical electrical equipment leakage current to the floor, to the shell leakage current, patient leakage current (letter

No. Pressurized part), patient leakage current (applied partial pressurization) and patient auxiliary leakage current (DC and AC) or laboratory standard enclosure leakage current and ground leakage current, etc. The instrument meets the general requirements of medical electrical equipment safety GB9706.1-2020 standard, laboratory requirements GB47 931-2007 standard test requirements, is a necessary safety test instrument for medical device manufacturers and testing departments. The power capacity of RK7500Y series instruments is different for each model.

Main property

1,can be set according to the category of test items, the same test item automatic combination test, synchronous display measured voltage value, external voltage value, normal state leakage current value, single fault state leakage current value.

2, can be a key to complete the ground drain current, the shell leakage current, patient leakage current (application of partial grid power supply voltage), patient leakage current (DC and AC) and other items of the test, can also be divided into items.

3, with power supply circuit overvoltage, overcurrent and MD measurement device overcurrent protection, with leakage current over limit acoutooptic alarm function.

4, with PLC interface, can be controlled by external; With RS232C interface, can communicate with computer to complete remote control.

5, the instrument has 5 groups of parameter memory function.

2、 Main technical indicators and parameters

1、Working temperature

1.1 Temperature: 0 ° C-40 ° C

1.2 Relative humidity: ≤ 80%

1.3 There is no strong electromagnetic interference source and corrosive gas around the instrument, and the ventilation is good.

2、 Power supply: AC 220 ± 10% 50Hz ± 2Hz

3、The instrument power consumption: ≤ 50W

4、 Measuring device: automatic range conversion, really effective measurement.

( 1) Medical GB9706. 1 -2020 standard a) Leakage current measurement range: I: 3 to 99.9uA Resolution: 0.1uA

II: 100 to 999.9uA Resolution: 0.1uA

III: 1000-9999uA Resolution: 1uA

b) Patient leakage current and patient auxiliary current: DC measurement range: 3-999.9uA resolution: 0.1uA

c) Measurement accuracy: 10~ 99.9uA ± 5% Ua 100 ~ 9999 + / - 5%

Note: The accuracy range is more than 10uA current

d) Frequency response range: DC ~ 1MHz

e) Measurement impedance circuit (MD) : in accordance with GB9706.1-2020 Figure 12

R1





V

C1



R1 10KΩ ±5%

R2 1KΩ ±5%

C1 0.015uF±5%

A) Measuring equipment BFrequency characteristic

2) Laboratory GB4793.1-2007 standard

a) Leakage current measurement range:

I:3 to 99.9uA

II: 100.0 to 999.9uA

III:1000 ~ 9999uA

b) Measurement accuracy:

10 ~ 99.9uA ± 5%

Resolution: 0.1uA

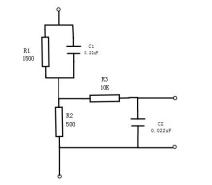
Resolution: 0.1uA

Resolution: 1uA

100 ~ 9999uA ± 5%

Note: The accuracy range is more than 50uA current

c) Impedan1ce measurement circuit (MD) : in accordance with GB4793.1-2007 Figure A.1



5. Output voltage ：

a) Measure the voltage output range of the power supply: 0~ 300V Resolution: 1V b)Accuracy: ± 5%

c) Capacity: RK7505Y:500W; RK7510Y: 1000 w; RK7520Y: 2000 w; RK7530Y: 3000 w;

RK7550Y: 5000W

6. Timing:

a) Range: 1~ 9999(s) Resolution: 1s

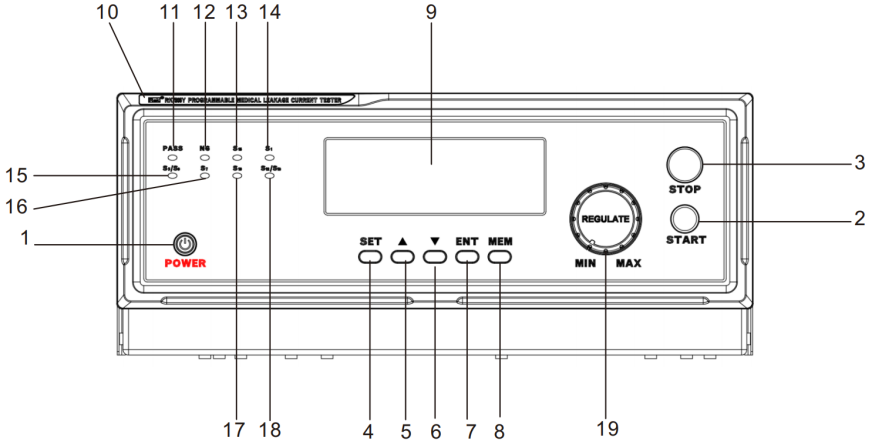
b) Accuracy: ± 5%

7. Size and Weight:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Type | RK7505Y | RK7510Y | RK7520Y | RK7530Y | RK7550Y | RK7550Y-2 |
| Weight | 23.15KG | 23.15KG | 38.7KG | 49.2KG | 74.1KG | 169.05KG |
| Size(D\*W\*L) | 445\*352\*160 | 445\*352\*160 | 533\*430\*210 | 533\*430\*210 | 610\*430\*238 | 927\*690\*600 |

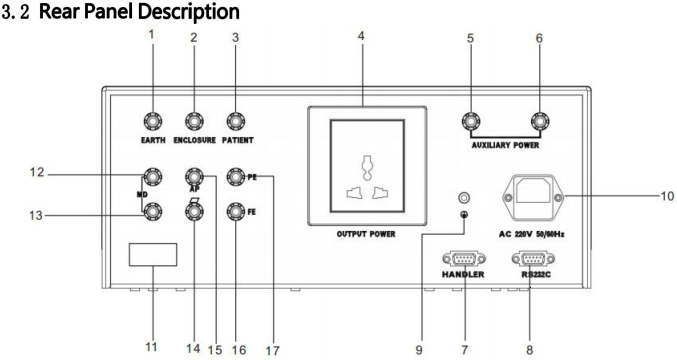
Chapter 3, Overview of Instrument Panel

**3.1 Front panel description**



1. "POWER" button: power switch, press the instrument to connect to the power supply
2. "START" button: press the instrument to start the test and start the light on.
3. "STOP" button: stop the test, if the alarm, stop the alarm.
4. "SET" button: press the instrument setting button, enter into the parameter setting state; press "START" key to light the light indicating that the instrument is in operation.
5. "" button: add the data key when setting the parameters, and press the data to increase.
6. "" " key: reduce the data key when setting parameters, press the data reduction.
7. "ENT" button: OK key, press to save the set data, and return to the standby state.
8. "MEM" key: storage key, press this key to set 5 sets of storage and call; this key has the shift function when setting the value.
9. "LCD display screen": information display window, using LCD2004C LCD screen.
10. Machine model labeling.
11. "PASS" lamp: the light light indicates that the test object is qualified.
12. "NG" lamp: the light indicates that the overleakage alarm of the test object is unqualified.
13. The "S15" lamp: corresponding to the "S15 switch" in the GB9706.1-2020.
14. "S1" lamp: when the instrument is in the single fault state of the power supply test, the lamp is on, corresponding to the "S1 switch" in the GB9706.1-2020.
15. "S5 / S9" lamp: the replacement indicator lamp, corresponding to the "S5 / S9 switch" in the GB9706.1-2020.
16. "S7" light: the light indicates that the "PE" port is on, corresponding to the "S7 switch" in GB9706.1-2020.
17. "S10" light: the light indicates that the "FE" port is on, corresponding to the "S10 switch" in GB9706.1-2020.
18. "S12 / S13 light": the light indicates that the "AP" port is on, corresponding to the "S12 and S13 switches" in GB9706.1-2020.

(19) "regulating knob": adjust the output voltage. Booup clockwise, counterclockwise. Usually, when the instrument is not in use, it should be rotated counterclockwise to the end.



1. "ground" jack: in the high-end MD, multi-mode combination test, connected to the "PE" end of the equipment under test.

(2) "shell" socket: in the high-end of MD, during the multi-mode combination test, connect to the "shell" end of the tested equipment, and the measured shell leakage current.

(3) "Patient" jack: in the high-end of MD, multi-mode combination test, connect to the "application part" of the equipment under test.

(4) Output power socket: test voltage output end.

(5) "Auxiliary power supply": auxiliary voltage output.

(6) "Auxiliary power supply": auxiliary voltage output.

(7) "HANDLER" interface: the control and output connection of the instrument and the external control equipment.

(8) "RS232C" interface: RS232C serial port communication interface.

(9) Ground end: enclosure ground end.

(10) Power socket: input AC 220V 50Hz power supply, equipped with fuse.

(11), the instrument nameplate

(12) "MD" jack: MD high-end.

(13) "MD jack": MD low-end.

(14)“  ”Jacks: connect the socket of the metal plate placed at the bottom of the measured instrument case, corresponding to the "S15 switch" in the GB9706.1-2020

(15) The "AP" jack: corresponding to the "S12 or S13 switch" in the GB9706.1-2020.

(16) "FE" jack: functional ground socket.

（ 17）"PE" jack: protective ground jack.



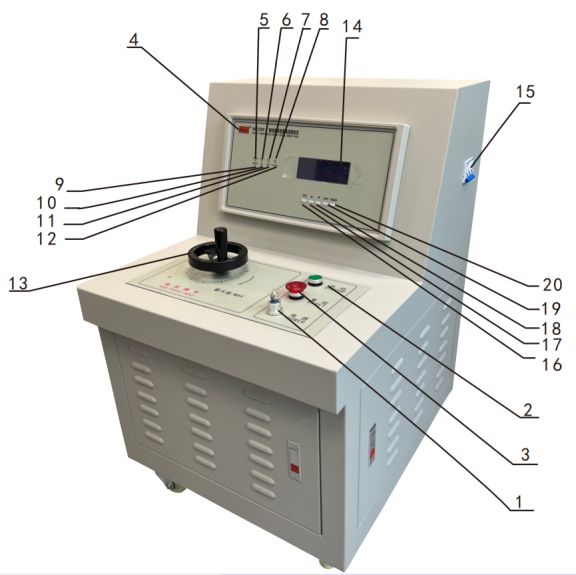
Note: Procedure for using MEM key

1. Press "ENT" on the standby interface to enter the "MEM" interface, as shown in the picture:



2. FILE: indicates the number of file groups. ENT: data storage; MEM: data invocation; SET: exit.

3.3 The RK7550Y-2 front panel description



1. "POWER" button: power switch, open the instrument to the power.
2. "STARTUP" button: press the instrument to start the test, and start the light on.
3. (3) "RESET" button: press to stop the test, if the leakage alarm, press to stop the alarm.
4. Machine model labeling.
5. "PASS" light: the light is on indicates that it is qualified by the test item.
6. "NG" light: the light indicates that the overleakage alarm of the test object is unqualified.
7. "S15" lamp: corresponding to the "S15 switch" in the GB9706.1-2020.
8. "S1" lamp: when the instrument is in the single fault state of the power supply test, the lamp is on, corresponding to the "S1 switch" in the GB9706.1-2020.
9. "S5 / S9" lamp: the replacement indicator lamp, corresponding to the "S5 / S9 switch" in the GB9706.1-2020.
10. "S7" light: the light indicates that the "PE" port is on, corresponding to the "S7 switch" in GB9706.1-2020.
11. "S10" light: the light indicates that the "FE" port is on, corresponding to the "S10 switch" in GB9706.1-2020.
12. "S12 / S13 light": the light indicates that the "AP" port is on, corresponding to the "S12 and S13 switches" in GB9706.1-2020.
13. "Pressure regulating turntable": adjust the output voltage size. Booup clockwise, counterclockwise. At startup, confirm that the turntable is at the 0 position.
14. "LCD screen": information display window, using LCD2004C LCD screen.
15. "Air switch": the blue switch is pushed up is open, pushed down is off.
16. "SET" button: instrument setting button, press the parameter setting state; press "START" to light the light indicates that the instrument is in operation.

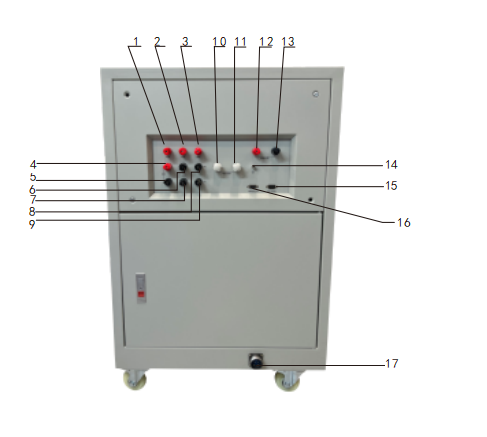
( 17)“  ”Key: increase the data key when setting the parameters, and press the data increase.

( 18)“ ” Key: reduce the data key when setting the parameters, and press the data reduction key.

( 19)“ ENT” Key: OK key, press to save the set data, and return to the standby state.

( 20)“ MEM”Key: Storage key to set 5 sets of storage and calls; this key has shift when setting values.

3.4 RK7550Y-2 Description of the rear panel



1. "ground" jack: in the high-end MD, multi-mode combination test, connected to the "PE" end of the device under test.
2. "shell" socket: in the MD high-end, multi-mode combination test, connected to the "shell" end of the tested equipment, the measured shell leakage current.

(3) "Patient" jack: in the high-end of MD, when the multi-mode combination test, connect to the "application part" of the equipment under test.

(4) "MD" jack: MD high-end.

(5) "MD" jack: MD low-end.

(6) "AP" jack: corresponding to the GB9706.1-2020. The "S12 or S13 switch" of the.

(7) “  ”Jacks: connect the socket of the metal plate placed at the bottom of the measured instrument case, corresponding to the "S15 switch" in the GB9706.1-2020

(8) "PE" jack: protective grounding jack.

(9) "FE" jack: functional ground socket.

(10) "Power output": test voltage fire wire (L) output.

(11) "Power output": test voltage zero line (N) output terminal.

(12) "Auxiliary power supply": the voltage output of the auxiliary power supply.

(13) "Auxiliary power supply": the voltage output of the auxiliary power supply.

(14) "Ground end": the enclosure ground end.

(15) "RS232C interface": RS232C serial port communication interface.

(16) "HANDLER interface": the control of the connection between the instrument and the external control equipment. (17) "Power socket": input AC220V / 50 / 60Hz power supply, equipped with fuse.



|  |
| --- |
| AC220V  power  supply |

|  |
| --- |
| power rectifier |

+5V +12V +5V



F

|  |
| --- |
| Medical equipment under test |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| current  measurement  circuit   |  | | --- | | Leakage |  |  | | --- | | Measuring impedance circuit |  |  | | --- | | 32 bit MCU circuit |  |  | | --- | | PLC circuit |  |  | | --- | | Keying circuit |  |  | | --- | | RS232Ccircuit |  |  | | --- | | Measuring switch  combinational circuit  (relay switching) |      |  | | --- | | pilot circuit |      |  | | --- | | Display Circuit (LCD2004  liquid Crystal) | |





It is mainly composed of the following parts.

The power supply circuit

Human analog impedance

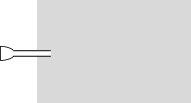
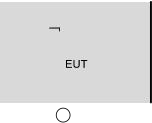
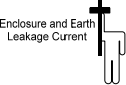
Leakage current detection

The signal processing

CPU control system

The remote interface

|  |  |
| --- | --- |
| power circuit | Power supply: Supply to GLC EUT Power supply: Supply power to the EUT device through the EUT channel on the rear panel. The normal operating voltage of the internal circuit. Input from socket to output from front panel |
| Leakage current  detection. | The leakage current detection loop is composed of a set of relays and a circuit composed of precision resistance and capacitance. MCU provides control signals. |
| Signal processing. | Signal processing includes signal amplification/attenuation circuit, current type selection circuit, digital sampling circuit, reference circuit and some control circuit. |
| MCU control system | MCU is a digital signal processing and control system, its periphery mainly includes keys, display, storage, clock, remote interface, protection circuit and so on. |
| Remote interface | Remote interface has RS-232C and PLC interface |



Surface to ground leakage current

|  |  |
| --- | --- |
|  |  |
|  |
|  |



Introduction to the leakage current mode

Definition: Leakage current refers to the electrical insulation between metal parts, or between live parts and ground parts, through the surrounding medium or insulation surface of the current is called leakage current in the absence of fault applied voltage. It consists of two parts, one is conduction current through insulation resistance; The other part is the displacement current through the distributed capacitance.

|  |  |
| --- | --- |
|  |  |
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|  |



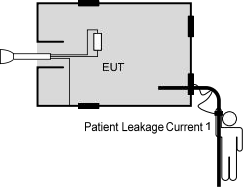




Description: Leakage current generated by the power supply network through or across the insulation layer and into the protective grounding wire current. For a Class I device, if the grounded human body touches the palpable conductor (such as the shell) connected to the protection grounding wire, the contact current will flow to the ground through the human body. When the current is greater than a certain value, there is a danger of electric shock.

|  |
| --- |
| Description:  Surfaces or surface parts that are accessible to the operator or patient during normal use (except application parts). A current flowing into the earth or other part of a surface through an external conductor connected to it other than a protective ground wire. In the case of Class II internal power supplies, leakage currents on all surfaces should be considered because they do not have protective ground lines; If it is a class I device, and it has a part of the surface is not connected to the ground, the leakage current of this part of the surface should be assessed |

|  |
| --- |
| Intersurface leakage current:  The leakage current between any two points that are not associated with the protection ground under normal or single fault conditions. The current flows from one part of the device through the human body to the other part of the device. |



Faulty Equipment

Patient Leakage Current 2

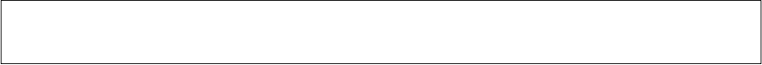


Patient leakage

I





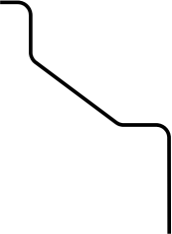


Description: Because the application part should touch the patient, and the patient is grounded, if there is a potential difference between the application part and the ground, there must be a current flowing from the application part to the ground through the patient (which should exclude the functional current needed for the treatment of the equipment), which is the patient leakage current.



Patient leakage current

II

EUT Applied

|  |
| --- |
|  |

Part





Description: Current partially flowing to ground from a patient through Type B application due to the unexpected presence of a voltage from an external source on the patient.



Patient leakage current

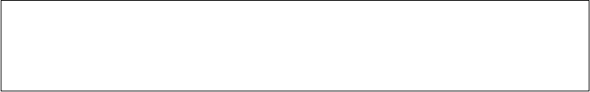
III





|  |  |
| --- | --- |
|  |  |
|  |
|  |  |





Description: Current that flows partially to ground from a patient through an F-type application due to the unexpected presence of a voltage from an external source on the patient.

List of leakage current modes

Check the fuse and connect the power cable

normal

single

fault

√

conditi on

√

Type

rema rks

The diagnosis

To ground drain current

Is there leakage current to earth?



Set up and down limits

Connectingthetestline

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  | One of the zero/fire lines is disconnected |  |
| Shell leakage current | √ | √ | 1. One of the zero/fire lines is disconnected  2. Ground protection is disconnected |  |
| Patient assisted leakage current | √ | √ |
| The patient patient assisted leakage current  AC | √ | √ |
| The patient patient assisted leakage current  DC | √ | √ |
|  | | | | |

4.4



Start



Turn on the power supply of the unit



Select Measurement network



Select measurement mode





Connect the EnT

TurnonEnTpower

Measuringfunctionsetting



Select the type of leakage



PressSTARTtostartthe

TurnoffEnTpower

Turnoffthepoweroftheunit



RemovethetestlineanddisconnecttheEnTline



Over

Refer to the content

Boot to prepare

Powered up

Measurement network selection

Measurement parameter setting

Selection of leakage mode

Selection of leakage mode

Connection of power supply and test line

Measurement parameter setting

Measurement parameter setting

The power shut down





5.1 Boot necessary

This section describes how to properly boot up and pre-operation Settings.

Boot to prepare

Before the AC power of the machine is turned on, make sure that the AC input voltage selection voltage of the machine meets the identification requirements (next to the rear panel socket), and then connect the power cord to the rear panel socket.



NOTE

220 v + 10% / 50 ~ 60 hz

\* For safety, use a grounded power cord.

Fuse Validation Check if the fuse meets the specification.

EUT input voltage confirmation

First confirm whether the EUT rated input voltage and test voltage, EUT rated power and so on meet the NOTE requirements, and then connect the power cord to the rear panel socket.



EUT power output

Input and output wiring

Corresponding relations

between

1, EUT power input and output connection method has a certain

correspondence, otherwise it will affect the accuracy of the relevant

NOTE measurement data .



5.2 Starting up

Turn on the power Press the power switch to turn on the power. The system

is initialized and then enters the measurement interface.



1. Before turning on the power, please confirm that the power switch of the EnT is disconnected.

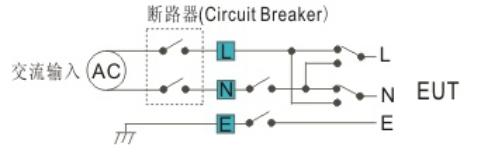
2. After entering the measurement interface, the machine will be set in the state of the last shutdown.

3. After starting, please measure after 30 minutes.

The power shut down



Usually, the power supply of the body to be tested should be turned off before the EnT power output is turned off. As shown in the figure, the EnT power supply line controlled by the internal relay of the machine is in the state of power off or to be measured. Only by turning off the circuit breaker can the power be completely turned off.



Power offPress the power switch to cut off the power supply.

5.3 Instrument parameter setting

There are five leakage current modes in total

Mod1:EL(current to floor drain)

Mod2:PL(Case leakage current)

Mod3:EV(leakage current applying partial on-grid supply voltage)

Mod4:AC(patient and patient assisted AC leakage current)

Mod5:DC(patient and patient assisted DC leakage current)

1. After pressing any key, press "SET" to enter the setting interface. The starting point is as shown in the picture below:

|  |
| --- |
| S-EL Mod:1 T:0002S  Type:2 Category 2  NC: 9010uA  SFC: 9900uA |

Press the "SET" key to move the cursor and select the parameters to be set successively, as shown in Figure 1.

Press "" and" "to change the data, press" ENT "to keep the Settings and save.

|  |
| --- |
| S-EL Mod:1 T: 0002 S  Type:2 Category 2  NC: 9010uA  SFC: 9900uA |

Photo1

RK7500Y Series Programe Medical Leakage Current Meiruike instrument (Guangdong) No.00000704

2. After setting parameters, connect the instrument and the device under test according to the wiring diagram in the appendix.

3, press the "start" key, first adjust the voltage regulator to the specified value, the instrument will automatically

Various combinations of tests. This is shown in Figure 9. After a test is complete, press the "START" key to restart the test. If not qualified

The instrument will send a sound and light alarm, stop the test, press "STOP" to clear.

Note: Restarting the machine after shutting down is the test state and parameter setting before shutting down.

|  |
| --- |
| Mod:1  T:000S  245V  001.3uA 001.2uA  T-EL  V:  NC: SFC: |

Photo 9

Instrument interface description:

"Mod" for table test mode, a total of 6 test mode.

Modes 1-5 are EL(to floor drain current) respectively.

M2:PL(enclosure leakage current)

M3: EV(leakage current applying partial grid supply voltage)

M4: AC(patient and patient auxiliary leakage current AC)

M5: DC(patient and patient auxiliary leakage current DC)

M6: indicates the extended mode

“T” indicates the test time

"Type" is set for the category, and there are 7 working modes:

The corresponding letter Gategory1 after Type1 indicates that the device under test belongs to class I and is tested in single mode. The corresponding letter Gategory2 after Type2 indicates that the device under test belongs to Class II, single mode test. The letter Gategory3 after Type3 indicates that the device under test is powered by internal power supply and tested in a single mode.

The corresponding letter Gategory1 Au after Type4 indicates that the device under test belongs to class I and is under continuous comprehensive test. The corresponding letter Gategory2 Au after Type5 indicates that the device under test belongs to Class II and is under continuous comprehensive test. The letter Gategory3 Au after Type6 indicates that the device under test is powered by internal power supply and is tested continuously.

The corresponding number "4793" after Type7 indicates that the device under test adopts GB4793's network for testing. Single mode: Tests in the current mode.

Continuous comprehensive test: it means that the instrument is automatically tested from mode 1 to mode 5. If the device under test belongs to class II or internal power supply, the instrument will be automatically tested from mode 2 to mode 5. However, the test instrument can only start from mode 1 if the device is either class I or Class II or internal power supply.

NC is the leakage current value in normal state .SFC is the leakage current value in a single fault state.

5.4 Leakage current measurement to Earth ( Mode 1)



FE PE

The medical equipment under test



Background/Connection Check that the power supply is properly connected, as shown in the figure

|  |  |  |  |
| --- | --- | --- | --- |
| power line   |  | | --- | | ap p l i e d pa r t |  |  | | --- | |  | | in  -  o ut |   PE  power input    FE      APU  RS23 2C      220V 50Hz    PLC  Enclosure of medical equipment under test  Medical equipment under test |

Measureme nt Settings confirm

Confirm MD, leakage mode, measurement setting, upper and lower limits and

other parameters.

Confirm MD, leakage mode, measurement setting,

upper and lower limits and other parameters.

panel

Press the red STOP switch to stop the measurement.

STOP

operation

5.5 Shell leakage current measurement (Mode)



Background/connection As shown, confirm that the power connection is normal.







|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | | APU |  |
|  | | | |  | | |

Power

line

|  |
| --- |
| ap p l i e d pa r t |

in

-

o

ut

power input



Shell of medical equipment under test

Measureme nt Settings confirm panel operation

Confirm MD, leakage mode, measurement setting,

upper and lower limits and other parameters.

Confirm MD, leakage mode, measurement setting,

upper and lower limits and other parameters.

STOP

Press the red STOP switch to stop the

measurement.

5.6 Leakage current Measurement of partially screened supply voltage from Type

Fapplication ( Mode 3)



Background/connection As shown, confirm that the power connection is normal.

|  |  |
| --- | --- |
| power line  PLC  RS23 2C              ap p l i e d  220V 50Hz  in-ou  PE  FE  power input  Shell of medical  equipment under test  plate metals  The medical equipment under test |  |

Confirm MD, leakage mode, measurement setting,

Measuremen t Settings

 ppe and lo e limits and othe pa amete surwrrrr.

confirm

panel

operation

Confirm MD, leakage mode, measurement setting,

STOP

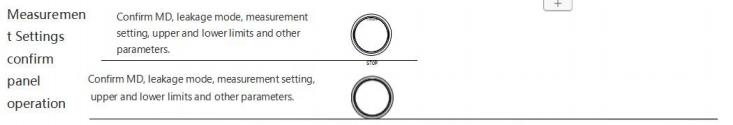
upper and lower limits and other parameters.

5.7 A pplication of partial to ground patient leakage current measurement (AC component mode 4, DC component mode 5)



Background/connection As shown, confirm that the power connection is normal.

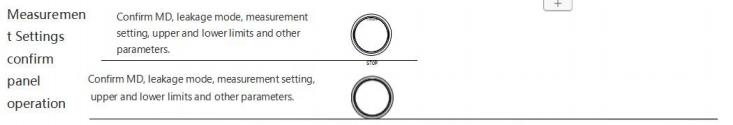
|  |  |  |
| --- | --- | --- |
| power line     |  | | --- | | ap p l i e d |   FE PE   |  | | --- | | RS23 2C  PLC      220V 50Hz |     in-  ou  power input  Shell of medical  equipment under test  plate metals  Medical device under test |



Measurement of patient leakage current from the application part to the housing of the 5.8 internal power supply device (AC component mode 4, DC component mode 5)

Background/connection As shown, confirm that the power connection is normal.

|  |  |  |  |
| --- | --- | --- | --- |
| 。  PLC   |  |  | | --- | --- | | |  | | --- | | RS23 2C      220V 50Hz | |   -  appli ed  IN-OU          Shell of medical  +  FE PE  equipment under test | |
| Medical device under test | Plate metals |

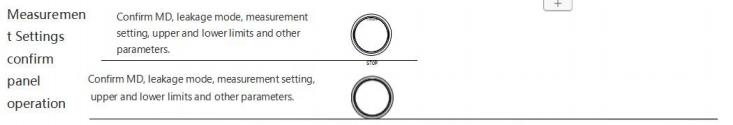


5.9 Measurement of patient leakage current from the Type F application section to the housing caused by external voltage in the internal power supply device ( Mode 3)



Background/connection As shown, confirm that the power connection is normal.

|  |  |
| --- | --- |
| |  | | --- | |  |   appli ed  IN-OU  +  -    FE PE  32C  PLC  220V 50Hz  Shell of medical  equipment under test    Medical device under test Plate metals |



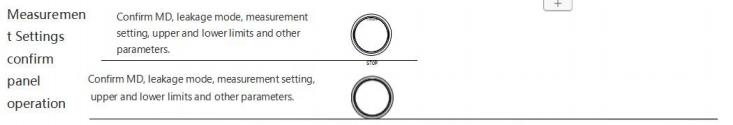
Patient-assisted leakage current measurement (AC) component mode 4, DC

5. 10 component mode 5)



Background/connection As shown, confirm that the power connection is normal.

|  |
| --- |
| power line  IN-OU  APU  PLC  RS232C  appl ied  FE PE        220V 50Hz          Shell of medical  power input  equipment under test  Medical device under test |

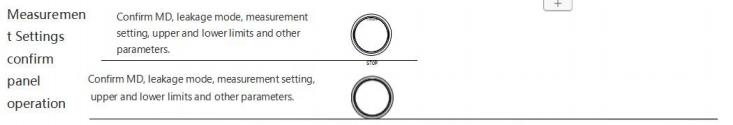


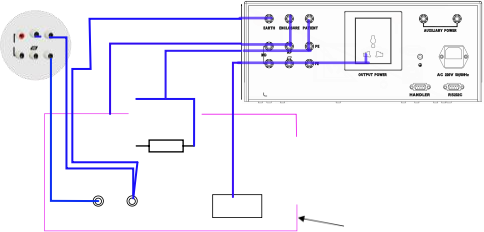
5.11 Patient -assisted leakage current measurement of internal power supply equipment (AC component mode 4, DC component mode 5)



Background/connection As shown, confirm that the power connection is normal.

|  |  |  |
| --- | --- | --- |
| PLC  IN-OU  Shell of medical equipment under test  FE PE  +         |  |  | | --- | --- | |  |  |   -  Medical device under test |



5.12 Multi-mode continuous combination test

Background/connection As shown, confirm that the power connection is normal.

APU

RS23 2C

Enclosure of medical equipment under test. The metal plateunder test

Medical equipment under test

power li

ne

PLC

220V 50Hz

appli ed

FE

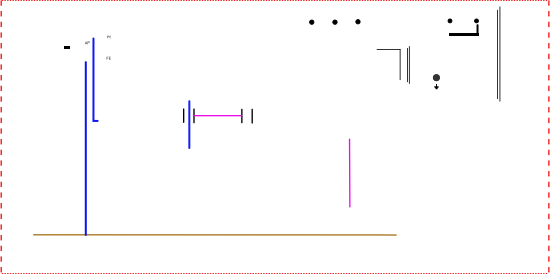
PE

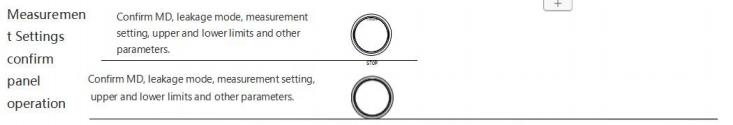
Metallic parts that are not protected from grounding

power input



Background/connection As shown, confirm that the power connection is normal.



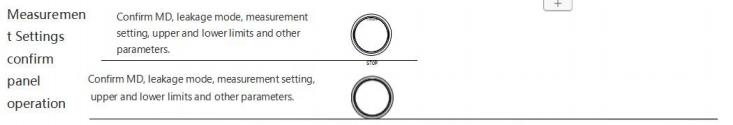


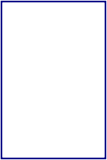


5.13 GB4793.1-2007 Testing standard

Current to floor drain (Mode 1)

|  |  |  |
| --- | --- | --- |
| power line      RS232C      220V 50Hz  C  equipment under test    FE PE   |  | | --- | | power input |   Enclosure of medical   |  | | --- | | Medical equipment under test | |





M a le

GND

C21

4 GND

5 C23 

1

3

2

11

10

C2+

J3

C2- V-

RS\_T1 RS\_T2

RS\_R1 RS\_R2

5

9

4

8

3

7

2

6

1

C22

104

104

GND

TX

RX

R4

10R

+5V 

12

9

RS232\_RX

6 

14

15

|  |
| --- |
| Chapter 6 Serial port RS232C remote control And SCPI command |

1 、 The principle of communication between serial ports is as the picture

shows

C19

GND     +3.3V

104  16

U6

C20

DB9 Public head

GND

VCC

C1+

C1-

V+

TTL\_T1 TTL\_T2

TTL\_R1 TTL\_R2



JH1

104

R3

10R

104

11

10

|  |
| --- |
| 4  3  2  1 |

RS232\_TX

GND

|  |
| --- |
| 7 |
| 13 |
| 8 |



SP3232



RS232

DB9-M

GND

2 、 Serial port communication set:

Remote control Settings

|  |  |
| --- | --- |
| background | Can be remotely controlled via RS-232C connection |

interface



RS-232C interface on rear panel

RS232C

The CO M

set

Set the COM port in the PC according to the following

Baud rate: 4800/9600/115200,

Check bit: None

Data bit: 8

Stop bit: 1

Data overflow control: None

2 、Serial port communication instruction set:

Brief description of instruction format:

1. The instrument instruction set describes only the actual characters that the instrument accepts or sends.

2, instruction characters are ASCII characters.

3, the command data " <?? > "are ASCII strings. The default format is integer or floating point, and the unit of data is an implicit value that does not appear in instructions.

4. The end of instruction must be marked by the end of instruction: the identifier of the end of an instruction, without which the instrument will not parse the instruction.

a) The default end tag is: carriage return (NL), print control (\n), decimal number (10), hexadecimal number (0x0A)

b) END tag of IEEE-488 bus: keyword ( ^END), signal (EOI).

2.1 S C PI instruction set

RK7505Y

●IDN?

● MMEM

The instrument subsystem command

●When the FUNCtion

● Low FETC

2.2 \* IDN? Subsystem command set

\*DIN subsystem command set is mainly used to query the instrument model and software version. \*IDN?

Example Query the software version of the machine model

Example: the \* IDN?

Returns the REK RK7505Y, 0,1.0. 0



2.3 FUNC tion subsystem command set

2.3.1FUNC tion subsystem command setIt is mainly used to set the test parameters of the instrument test function. Command tree：

F U N Ct i o n :

S TA Rt

S T O P

S O U R ce :



: M O D E

: TY P E

: T T I M e

: N C C U R R

: S F C C U R R

2.3.2 PROG Functional Command Set

FUNC ：STARt

FUNC ：STOP

FUNC ：SOURce MODE FUNC ：SOURce TYPE FUNC ：SOURce TTIMe FUNC ：SOURce NCCURR FUNC ：SOURce SFCCURR

When the instrument is in the test interface, start the test. When the instrument is in the test interface, stop the test. Test mode

Test categories

The test of time

Maximum NC current of a test category Maximum SFC

current of a test category

2.3.2.1 FUNC: STARt

FUNC:SOURce:STARt

The test start

2.3.2.2 FUNC: STOP

FUNC:SOURce:STOP

The test reset

2.3.3 FUNC: SOURce: MODE Set/query the test mode

Setting format: FUNC:SOURce:MODE < Status value >

Query format: FUNC:SOURce:MODE?

-- data < status value >

Data type: integer

Data range: 1/2/3/4/5/6

1:EL (floor drain current) 2:PL (housing drain current) 3:EV (application part of the net

Leakage current of supply voltage) 4: AC (patient, patient auxiliary leakage current AC)

5:DC (patient and patient auxiliary leakage current DC)

6: Extended mode

2.3.4 FUNC: SOURce:TYPE

Sets/queries the test category

Setting format: FUNC:SOURce:TYPE < Status value >

Query format: FUNC:SOURce:TYPE?

-- data < status value >

Data type: integer

Data range: 1/2/3/4/5/6/7

1-7: Type 1-7

2.3.5 FUNCtion:SOURce:TTIMe

Set/query the test time of the current test mode test category

Setting format: FUNCtion:SOURce:TTIMe<Status value >

Query format: FUNCtion:SOURce:TTIMe?

-- data < status value >

Data type: integer

Data range: 1-9999

2.3.6 FUNCtion: NCCURR

To set or query the maximum NCcurrent in the current test mode Setting format: FUNCtion:NCCURR < Status value >

Query format: FUNCtion:NCCURR?

-- data < status value >

Data type: integer

Data range: 3-9999(Max. 1000 in mode 5)

Corresponding to the uA

2.3.7 FUNCtion: SOURce: SFCCURR

Set/Query the maximum SFC current of the current test mode

Setting format: FUNCtion:SOURce:SFCCURR< Status value >

Query format: FUNCtion:SOURce:SFCCURR?

-- data < status value >

Data type: integer

Data range: 3-9999(Max. 1000 in mode 5)

Corresponding to the uA

2.4 Commands of the MMEMsubsystem

MMEM:SAVE

Saves the test Settings for the current mode test category to internal storage Setting format: MMEM:SAVE < Status value >

-- data < status value >

Data type: integer

Data range: 1/2/3/4/5

Corresponds to the storage file 1-5

MMEM:LOAD

Read the test Settings saved in internal storage to the current Settings Setting format: MMEM:LOAD < Status value >

-- data < status value >

Data type: integer

Data range: 1/2/3/4/5

Corresponds to the storage file 1-5



2.5 FETCH

FETCh:AUTO

Set/query the automatic output status of test data

Set format: FETCh:AUTO < Status value >

Query format: FETCh:AUTO?

-- data < status value >

Data type: integer



FUNC:SOURce:MODE#:TYPE#:SETMEASPSRA

Set the number of test parameters under corresponding mode:

Data Fan Wai:

mode l 1 - 6

Mode l 1 - 7

T im e 1 -9999

NC 3 -9999

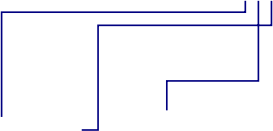
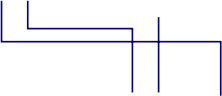
SFC3 -9999

T im e corresponds to seconds, NCCSFC corresponds to uA

Fan:

FUNC: SOURce: MODE1: TYPE1: SETMEASPSRA 30.9999 .9999 The last three numbers correspond to

time, NC, and SFC

Chapter 7 Handler(PLC) Interface

12V +

12V +

12V +

T EST \_STO P

TE ST\_STA R T

GND 

PT2

REY2

REY1

2

2

REY3

2

1

1

U8 TLP185

U9

TLP185

There are three monitoring signals output of PROCESSING(TEST in progress), PASS(test passed) and FALL(test failed) and two remote control signals input of test and RESET. The wiring is as follows:

Output signal of PROCESSING: between PIN2 and PIN5 (with 2-point conduction of signal) FALL output signal: between PIN6 and PIN7 (2-point conduction with signal)

PASS Output signal: between PIN8 and PIN9 (2-point conduction with signal) START Output signal: between PIN3 and PIN1 (2-point conduction with signal) STOP output signal: between PIN4 and PIN1 (2-point conduction with signal)

GND

Female

J4

DB9 Handle

12V+

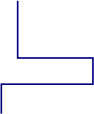




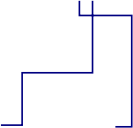
R10

R11 3.3K

3.3K



1

3

3

3



4 5

4

5

4

5







HJR-3FF-S-Z HJR-3FF-S-Z

HJR-3FF-S-Z



D2 D3

GND

GND

D1 1N4007

1N4007

1N4007

Handler & Signal Connector

R1 10K

R2 10K





+3.3V

+3.3V

Chapter 8 Packing List

SHENZHEN MEIRUIKE ELECTRONIC TECHNOLOGY CO.,LTD

Machine model: RK7505Y

The following is the packing list. Please check and check carefully after unpacking. If there is any defect or damage, please Contact Merrick's distributor or our company in time.

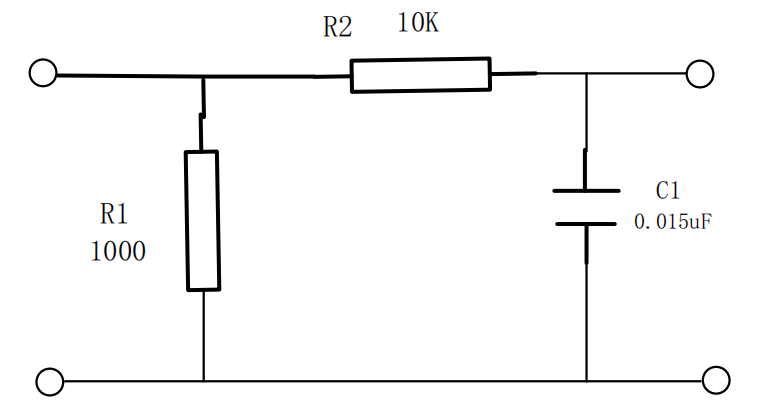
|  |  |  |
| --- | --- | --- |
| Product name | Model | Quantity |
| Program controlled  medical leakage current  tester | RK7505Y | 1 PCS |
| The instructions | USBflash disk | 1 PCS |
| The calibration report | / | 1 PCS |
| The power cord | RK00001 | 1 PCS |
| Certificate of approval | / | 1 PCS |
| Test line (red/black) | RK00049/RK00050 | 6 PCS/6PCS |
| RS232 cable | RK00002 | 1 PCS |
| RS232 USB cable | RK00003 | 1 PCS |
| RS232 to USB drive CD-  ROM | Optical disk | 1 PCS |

Machine model: RK7550Y-2

The following is the packing list. Please check and check carefully after unpacking. If there is any defect or damage, please Contact Merrick's distributor or our company in time.

|  |  |  |
| --- | --- | --- |
| Product name | Model | Quantity |
| Program controlled  medical leakage current  tester | RK7550Y-2 | 1 PCS |
| The instructions | USBflash disk | 1 PCS |
| The calibration report | / | 1 PCS |
| The power cord | RK00066/67 | 1 PCS |
| Certificate of approval | / | 1 PCS |
| Test line (red/black) | RK00049/RK00050 | 6 PCS/6PCS |
| RS232 cable | RK00002 | 1 PCS |
| RS232 USB cable | RK00003 | 1 PCS |
| RS232 to USB drive CD-  ROM | Optical disk | 1 PCS |
| fuse | 50A | 1 PCS |
| key | Power switch key | 1 PCS |

Appendix 1: MD Network

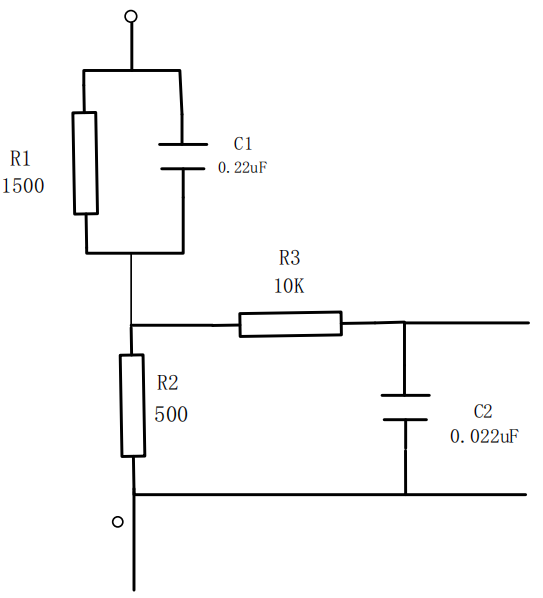


R1 ： 1kΩ

R2 ： 10kΩ

C1 ： 15nF

GB9706.1-2020 Photo 12



R1 ： 1.5kΩ

R2 ： 0.5k Ω

R3 ： 10k Ω

C1 ： 0.22uF

C2 ：0.022uF

GB4793.1-2007 Photo A.1

Appendix 2: Instrument calibration chart

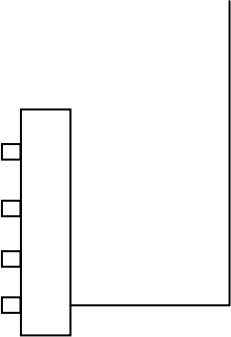
1、Current calibration

|  |  |
| --- | --- |
| Rear panel of the instrument  Front panel of instrument   |  | | --- | | 10.00 |       COM            Multim eter current level stand ard resi sta nce box  Ac current calibration diagram |

|  |  |  |  |
| --- | --- | --- | --- |
| Rear panel of the instrument  Front panel of instrument   |  |  | | --- | --- | | |  | | --- | | PLC      2 20V | |  |  | | --- | | 10.00 |   COM  Multim eter current level stand ard resistance box  Dc current calibration diagram |

1、Voltage calibration

|  |  |
| --- | --- |
| Front panel of instrument | Rear panel of the instrument |
|  |
| 10.00        Voltage range of multimeter |
| Voltage calibration diagram | |



S5

|  |
| --- |
| OUTPUT |

|  |
| --- |
|  |

|  |
| --- |
| INPUT |



AC

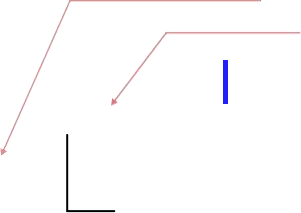
|  |
| --- |
|  |
|  |

S1

|  |
| --- |
|  |

|  |
| --- |
|  |

Power supply single - line disconnect analog circuit

Power polarity switch part

|  |
| --- |
| The machine being tested |



The ground wire disconnects the analog

`circuit



S10



S12



S13

E

36



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