HIOKI

USER'S MANUAL

WT-8751
WT-8752
WT-8753

PUNCTURE INSULATION METER

HIOKI E. E. CORPORATION

※※※ Legal Notices ※※※

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※※※ Revision History ※※※

Rev	Name	Description
0402001	T.White	Basic issue

※※※ Inspection and Examination ※※※

Before the instrument exit the factory, we have a series of inspection and measurement on mechanical and electrical characteristics. Make sure its function of operating for the quality warranty of the product. If collision results in damages and defects of the quality and the performance, please contact us for prompt service.

WT-8751 Standard accessories

Item		Q'ty	Remark
WT-8751		1	WT-8751 Host
Power cord		1	Line cord
3P – 2P adapter		1	Power cord adapter
Test cable (1)		1	HV Lead
Test cable (2)		1	LV Lead
Test cable (3)		1	Ground Continuity Lead
Manual	Please refers page1 of this manual	1	English Manual

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Test cable (1)		1	HV Lead
Test cable (2)		1	LV Lead
Test cable (3)		1	Ground Continuity Lead
Test cable (4)		8	1m 20kV Lead
Manual	Please refers page1 of this manual	1	English Manual

Optional accessories

Item	Part No.	Q'ty	Remark
Print Board	WTO-509	1	WT-8750 series
GP-IB Interface	WTO-508	1	WT-8750 GP-IB Interface

※※※ The Danger of Operating ※※※

1. When the instrument is under output voltage, please don't touch test area or you may shock hazard and result in death.

   Please obey the following items.
   - Make sure the grounding cable is connected correctly and using the standard power cord.
   - Don't touch the output terminal.
   - Don't touch test cable of connecting test termination.
   - Don't touch test termination object.
   - Don't touch any charge component of connecting output terminal.
   - As the instrument end the test or turn off output, please don't touch test unit immediately.

2. The shock accidents are usually occurred on the following conditions.
   - The grounding terminal of the instrument doesn't connect correctly.
   - Do not use insulation glove for testing.
   - After test is completed to touch test unit immediately.

※※※ Storage. Freight. Maintenance. Disposal ※※※

Storage

When don't use the device, please pack it properly and store under a good environment. (The packing is no needed when the device under appropriate environment.)

Freight

Please use the original packing material when move the device. If the packing material is missing, please use the equivalent buffer material to pack and mark it fragile and waterproof etc to avoid the device damage during movement. The device belongs to precise equipment, please use qualified transportation as possible. And avoid heavy hitting etc to damage the device.

Maintenance

There is no maintenance operation for the general user. (Except for the note in the manual.) Please contact our company or agent when the device occurred the user judgment abnormal. Don't maintain by yourself to avoid occurred unnecessary danger and serious damage to the device.

Disposal

When the device in badly condition and can't be used or repaired, please discard it according to your company disposal procedures or local legal procedures. Don't discard arbitrary to avoid polluting environment.

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1. Introduction

1.1 General

Automatic withstand / insulation / grounding testers of the instrument are designed for automatic withstand, insulation resistance, grounding resistance and dynamic leakage current test of electromechanical and electronic equipments.

Testing aspect of withstand voltage, the output power of the tester is AC: 150VA(5kV, 30mA), DC: 60VA(6kV, 10mA). Therefore, it is for withstand test of electronic and electromechanical and component.

Testing aspect of insulation resistance, the measurement range of the tester is 0.1MΩ ~ 50GΩ and test voltage range is 50V ~ 1000V can be set arbitrary.

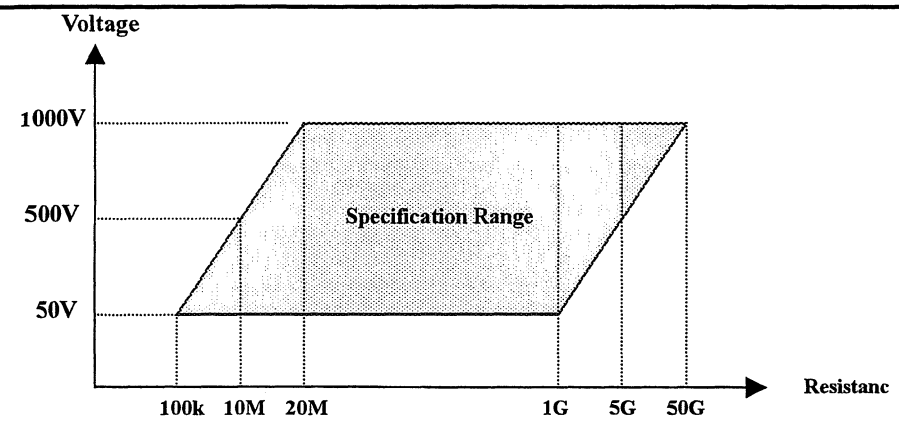
All of setting status, time, current, voltage, resistance value, memory number etc are list on the display, it is unnecessary to remember any parameter status which be set. The tester equipped with Good and No Good judgment machinery and signal output of testing result and remote control. It is also for GPIB interface, SCANNING interface, RS232 interface of automatic test system. The above equipments makes high efficient and accurate test.

1.2 Features

- AC / DC withstand voltage, insulation resistance test three in one model.
- DC open circuit detection patent design.
- Reformation DC quick discharge patent design.
- With 0.4ms cut off and 0.2sec discharge quickly.
- Keypad locked and material protection function.
- Charge current low limit detection function.
- Combine 500 test procedures totally or 100 sets of memory function.
- GP-IB, PRINTER interface optional.
- Full-function front panel calibration.
- The instrument is with [FALL] function, before ending test to change output test voltage. The needed time is from setting voltage value to zero.

2. Specifications (18°C ~ 28°C RH ≤ 70%)

❑	Scan Unit	8 ports, · ±phase (WT-8753 only)
❑	**Withstanding Voltage Test**	
❑	Test Voltage	AC: 0.05 ~ 5kV/ DC: 0.05 ~ 6kV Constant Voltage
❑	Voltage Regulation	≤ (1%+5V), Rated Load
❑	V-display Accuracy	± (1% of reading + 5 digits), 2V resolution
❑	Cutoff Current	AC: 0.1mA ~ 30mA , DC: 0.01mA ~ 10mA , 0.1uAdc resolution
❑	Current Accuracy	<1.2kV ± (1% of reading + 5 digits) ≥1.2kV AC:+5digits/kV DC:+2digits/kV Real Current ± (5% of total current + 20 digits) WAC only
❑	Current Display	Hi limit setting Display Range < 300uA: 0.1uA~299.9uA (dc only) < 3mA: 0.001mA~2.999mA <30mAac (10mAdc): 0.01mA~30.00mAac (10mAdc)
❑	Output Frequency	50Hz, 60Hz
❑	Test Time	0.3 ~ 999 Sec, continue
❑	Ramp Time	0.3 ~ 999 Sec, off
❑	**Arc Detection**	
❑	Setting Mode	Programmable Setting
❑	Detection Current	AC: 1mA ~ 15mA, DC: 1mA ~ 10mA
❑	Min. pulse width	10us approx.
❑	**GOOD/NO-GO Judgment Function**	
❑	Judgment System	Window comparator. A NO-GO judgment is made when a current greater than the high limit value or smaller than the low limit value is detected. When a NO-GO judgment is made, the output voltage is cut out and a NO-GO alarm signal is delivered. If no abnormal state is detected during the test time a GOOD judgment is made and a GOOD signal is delivered.
❑	**Insulation Resistance Test (WT-8752,WT-8753 only)**	
❑	Test Voltage	DC: 0.05kV ~ 1kV, Constant Voltage
❑	V-display Accuracy	± (1.5% of reading + 5 digits) (open voltage), 2V resolution
❑	Resistance Range	0.1 MΩ ~ 10 GΩ (WT-8752 up to 50GΩ)
❑	Measuring Accuracy	≥ 500: 1 MΩ ~ 1GΩ: ± (5% of reading + 10 digits) 1GΩ ~ 10 GΩ: ± (10% of reading + 10 digits) 10GΩ ~50 GΩ: ± (15% of reading + 10 digits) (WT-8752 only) < 500V: 0.1 MΩ ~ 1GΩ: ± (10% of reading + 10 digits)



❑ **Secure Protection Function**	
❑ Fast Output Cut-off	0.4mS typical after NG happen
❑ Fast Discharge	0.2S, Typical
❑ Ground Fault Interrupt	Standard ON/OFF
❑ Continuity Check	Standard ON/OFF
❑ Panel Operation Lock	YES
❑ **Memory Storage**	
❑ Memories, Steps	50 steps or 99 groups for total 500 memory locations
❑ **GO/NG Judgment Window**	
❑ Indication, Alarm	GO: (Short Sound) NG: W-Arc, W-Hi, W-Lo, IR-Lo, IR-Hi, GFI, Continuity-fail (Long Sound)
❑ **Remote Connector**	
❑ Rear Panel 9 Pin D-type Connector	Input: Start, Stop, Interrupt (at 11 pin terminal block) Output: Under test, Pass, Fail
❑ **Ambient Temperature and Relative Humidity**	
❑ Specifications range	18 to 28°C (64 to 82°F), ≤ 70% RH.
❑ Operable range	0 to 40°C (32 to 104°F), ≤ 80% RH.
❑ **Power Requirement**	
❑ Line Voltage	AC 100V, 120V, 220V ± 10%, 240V +5 -10%
❑ Frequency	50 or 60 Hz
❑ Power	No load: < 100W
❑ Consumption	With rated load: 500W max.
❑ Dimension	320W x 105H x 400D mm
❑ Weight	WT-8751,WT-8752: 14kg approx. WT-8753: 15kg approx.

3. Notice Items before Use

The tester is with high voltage output up to 6kV sending to external test. It may occurred injury and death result from error operation. Please peruse notice item of this chapter and remember to avoid accident.

1. Shock Hazard

For preventing shock be occurred. Before using the tester, put on insulation glove firstly and then running function related to electricity.

2. Grounding

There is a ground terminal on the rear panel cover of the tester. Please use appropriate implement to connect the ground terminal to earth actually. If not, there may be high voltage existed on the cover of the tester. It is very danger whatever touches the machine under the above statuses. It may cause shock hazard, therefore please make sure to connect ground terminal to earth. As figure 3-1 arrow denotation.

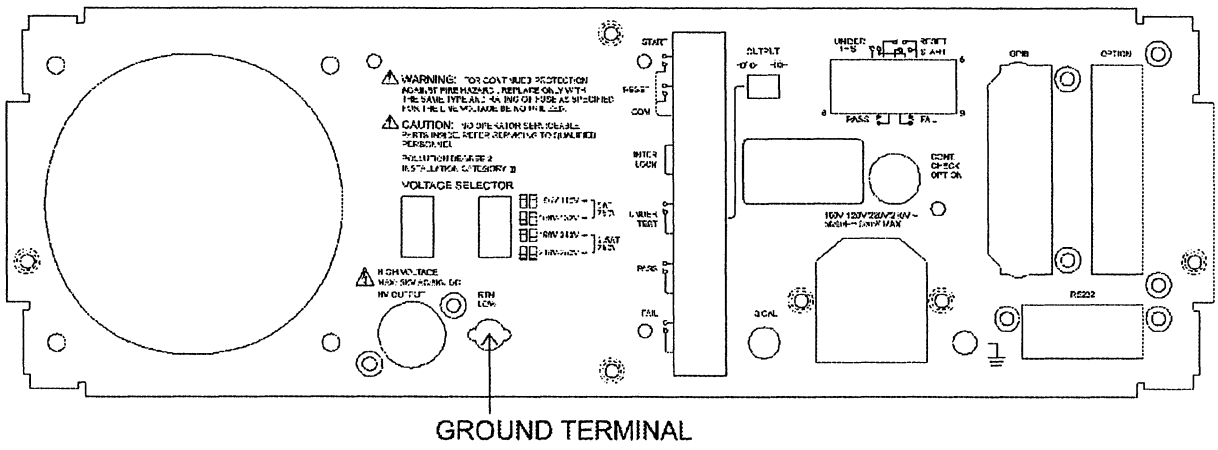
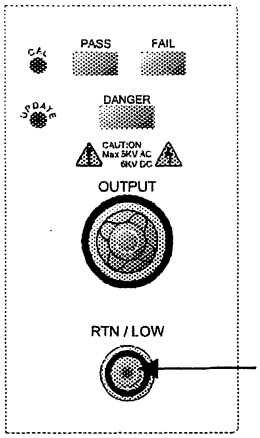


Figure 3-1

3. Connect test cable to COMMON terminal

As figure 3-2 arrow denotation, connect test cable to COMMON terminal. It is necessary to check if there is loosen or drop under operation condition at any time. If you want to connect DUT by testing cable, please connect test cable of COMMON terminal to DUT. (COMMON terminal, which has connected to the main unit) The uncompleted connection of test cable of COMMON terminal or drop is very danger, as there is full of high voltage on DUT.



The test cable of the terminal be sure connected and locked.

Figure 3-2

4. Connection test of high voltage output terminal

After the test cable of COMMON terminal has been connected. Then follows the below procedures to connect high voltage output cable.

- Press [STOP] key firstly.
- Confirm DANGER indication LED is not light.
- The test cable of COMMON terminal with high voltage output terminal is short, confirm there is no voltage output.
- Plug high voltage test cable in high voltage output terminal.
- Connect the test cable of COMMON terminal to DUT finally, and then high voltage test cable also be connected.

5. Test stop

When the test is over the and no need to use, or the tester is not run status or needs to exit during use, please be sure power switch is on 0 (that is turn off power). As figure 3-3.

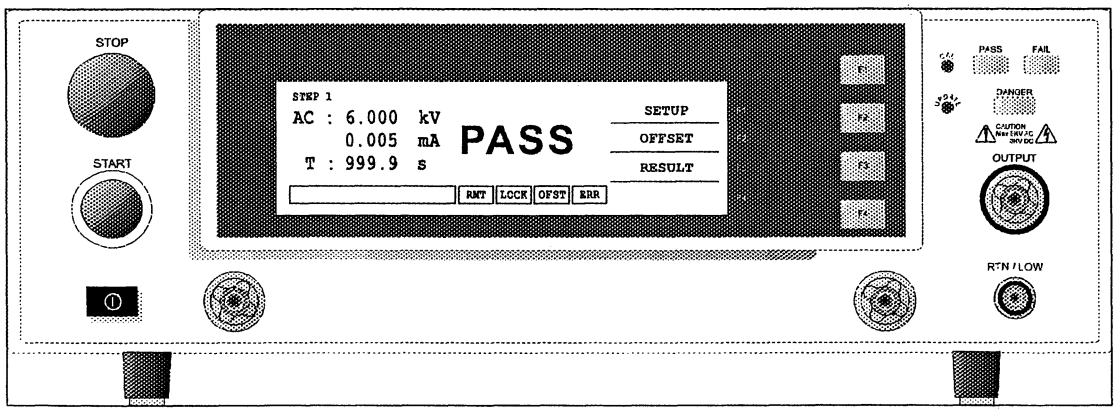


Figure 3-3

6. The dangerous area under test mode

It is very danger to touch high voltage area under operation status. Such as touch DUT, test cable, probe and output terminal.

☞ *Attention*

When the main unit is under test status, please don't touch alligator clipper on test cable. Because the insulation of plastic layer is not enough, touch it may cause hazard. As figure 3-4.

Please don't touch here when high voltage output

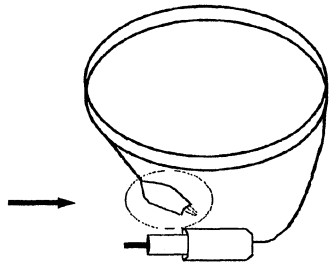


Figure 3-4

<<< Warning ! When the output terminal is cut off. >>>

7. Test complete confirmation

You may touch DUT, high voltage test cable or output terminal etc high voltage areas under modifying circuit or others test requested conditions. Please confirm the following at the first.

Power switch is turned off.

As the insulation resistance test unit, DUT may full of high voltage when test is completed. In the meantime, you need to pay attention to obey descriptions of item 8 and 9 of this chapter. As the described procedures to execute.

<<< Note! When testing insulation resistance is charging. >>>

8. Charge

When the insulation resistance is testing, DUT, capacitor, test cable, probe and output terminal even includes the tester are full of high voltage. After turning off the power switch, it needs a period of time to discharge. Please obeys the above descriptions, don't touch any place may cause shock especially on power just turn off.

9. Confirm charging voltage has been discharged completely

The discharged time of charging voltage is depends on testing voltage and DUT characteristic. To assume that high voltage add to DUT is equivalent to high voltage add

to 0.01uF capacity parallel 100MΩ resistance circuit. When test voltage is 1000V, then after turned off power, the voltage which add on testing and DUT decrease to lower than 30V and needed time about 3.5 seconds. When test voltage is 500V, needs about 2.8 seconds. To assume the time constant of DUT is known, if you want to know the voltage decrease to below 30V needed time. Please follow the above procedures, multiply needed time of decreasing to below 30V by time constant. As figure 3-5.

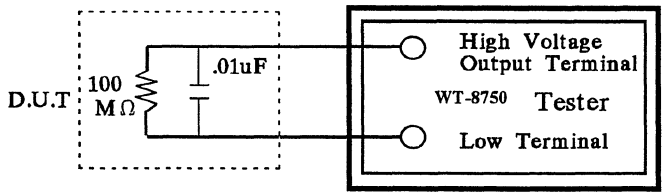


Figure 3-5

<Formula>

Test Voltage * $e^{-t/RC}$ = Residual Voltage

Ex.: 1000V * $e^{-t/RC}$ = 30V

$\ln e^{-t/RC} = \ln 0.03$

$-t / RC = -3.5$

$t = 3.5$ sec

10. Remote control the main unit

The instrument with remote control, high voltage output control by external control signal usually. For your safety and prevent from hazard, please obeys the following rules.

- Don't allow any unexpected high voltage output that may cause danger.
- When the main unit output high voltage, don't permit the operator or others personnel to contact DUT, test cable and probe output terminal.

11. Turn on or turn off power switch ※ Note ※

When power switch is cut off, it needs a few seconds to re-turn on. Please don't turn on and turn off continuously. It is very danger to do that under high voltage output. When turn on or turn off power, don't connect any object to high voltage output terminal to avoid hazard, which result from abnormal high voltage output.

12. Others notice items

Don't make short-circuited of output cable, grounding cable, transmission cable or AC power to prevent from the tester is full of voltage. Please connect the cover of the tester to earth firstly when high voltage output terminal is short-circuited with COMMON terminal.

<<< Dangerous event >>>

13. The danger handling

Under any danger circumstances, such as shock, DUT burning or the main unit burning. Please obey the following procedures to avoid the more danger.

- Cut off power switch firstly.
- Then pull off the plug of power cord.

<<< Solution >>>

14. Problems

Under the below circumstances, the occurred problem are very danger. Even press [STOP] key, the output terminal may output high voltage.

- When press [STOP] key, DANGER indication LED is still light.
- The voltage meter without voltage reading but DANGER LED is still light.

When the above conditions are occurred, please turn off power and pull off AC power plug immediately. Don't use any more, please send to our company or office for reparation.

15. DANGER indication LED error

When press [START] key, there is already reading on the voltage meter and DANGER LED is still not light. In the meantime, the indication LED may be error please turn off immediately. Please send it to our company or office for reparation.

16. If the tester needs long time using under normal operation. Please notice the following items.

If the high limit setting value is 20.00mA (withstand voltage test), please notice its' ambient temperature. When the ambient temperature is higher than 40°C, please stop operation until it cools down to normal temperature.

17. The tester includes four kinds of AC INPUT power. Please accord with local voltage turn the voltage selection switch on rear panel to the right position.
When you want to plug in power cable, be sure input AC power scale is the same as rear panel switch power. Also need to replace fuse, the following table is voltage and fuse which be used.

Scale	Nominal Value	Range	Fuse
90V ~ 110V	100V	90V ~ 110V	5A Slow/250V
108V ~ 132V	120V	108V ~ 132V	5A Slow/250V
198V ~ 242V	220V	198V ~ 242V	2.5A Slow/250V
216V ~ 250V	240V	216V ~ 250V	2.5A Slow/250V

Be sure used voltage when replace fuse. Only can replace fuse under power-disconnected status by flat type screwdriver.

Warning

Please use correct specification when replace fuse or may cause hazard.

18. Normal operation of the unit is AC power. If power is unstable within selection voltage range, it may cause the unit function is not actual or abnormal. Therefore, please use appropriate equipment turn to suitable power such as power stabilizer.

19. The tester use power transformer is over 200VA. When DUT drawing mass current. Before deadline of no good judgment and output current, it may flows mass current (about ten amperes) up to ten milliseconds. Before processing test may be the same condition. Please notice the capacity of power cord and the current cable of linking with other instrument or equipment.

20. Storage

The unit normal operation temperature humidity range is 5°C ~ 40°C, 75% RH. If over this range then function may malfunction. The unit storage temperature range is -10°C ~ 50°C, 80% RH. If you don't use it for a long time, please use original material packing and then store it. For correct test and safety, please keep it from direct sunlight or high temperature, vibration, humidity and dusty place.

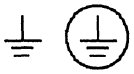
21. Warm up

All functions of the tester are activated when the power switch is turned on. However, to attain the precision in the specification, please warm the instrument over 15 minutes.

22. Safety symbol

: There is lethal voltage on output terminal. Please peruse all safety operation notice items.

: There is detailed explanation in the operation manual, please peruse the descriptions of the manual.



: Protective grounding terminal for preventing electrical shock in case of leakage to the cover. The terminal must be connected to ground before operation of equipment.

Warning : Warning sign for preventing a procedure, practice or other conditions which may result in injury or death of personnel if it is not rightly operated.

Caution : Warning sign for preventing a procedure, practice or other conditions which may result in the instrument and other DUT abnormal.

Note : Note sign. Refer to the procedure, practice or other conditions, please peruse particularly.

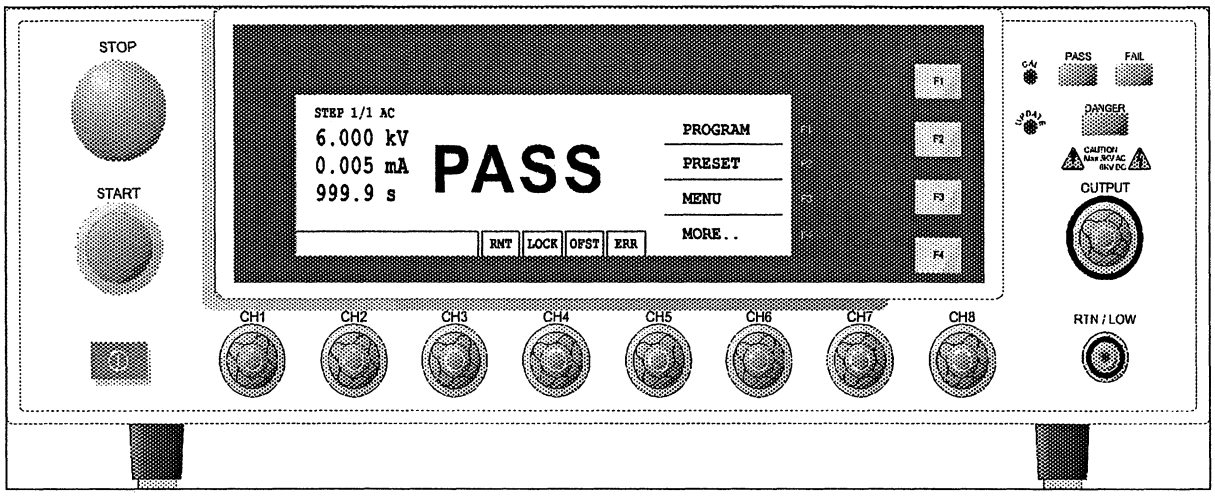
23. Warning signal of testing

"DANGER – HIGH VOLTAGE TEST IN PROGRESS, UNAUTHORIZED PERSON KEEP AWAY"

4. Panel Description

4.1 Front Panel Description

Front panel includes several function areas which easy to use. This paragraph will introduce each control and information on LCD to you.



■ **Display Area**

Function key display area : Under different display menus, there are different function descriptions. The right side of display has corresponding function keys (F1-F4). If the description is blank, it means corresponding function is invalid.

State list : This list indicates the setting mode, the range of setting value and displays no good state of testing result.

RMT : When this area is highlighted, it means the main unit is under Remote status. That is the main unit controlled by PC through GPIB/RS232 connecting cable. At the same time, all of keys are malfunction except for [STOP], [Local] and [MORE..] Keys.

LOCK : When this area is highlighted, it means the main unit is under setting parameter protected mode. The other mode can't enter except for "MEMORY", "TEST" and "KEY LOCK" modes.

OFST : When this area is highlighted, it means the main unit has been zeroed the leakage current of test cable and test lead currently.

ERR : When this area is highlighted, it means there is unclear error in error queue.

Danger LED : The testing status indication LED. When LED is light, the tester is under testing status. There is high voltage or mass current on testing terminal. Don't touch the testing terminal at the same time.

PASS LED : When this LED is light, it means DUT judge as PASS after testing.

FAIL LED : When this LED is light, it means DUT judge as FAIL after testing and then cutting off the main unit output immediately. This LED keeps on light until the main unit be pressed [STOP] key.

■ **Key Area**

Power Switch : The switch provides AC power source which the tester is needed.

STOP Key : Reset key, after pressing this key the main unit return to standby testing status immediately. That is cutting output and clear all of judgments simultaneously.

START Key : After pressing this key, the main unit is under testing status. The testing terminal has output and each judgment function starts simultaneously.

Cal-Enable : Calibration switch. This key is only for calibration before exiting factory. A non-professional personnel using this function is prohibited or may cause the product malfunction.

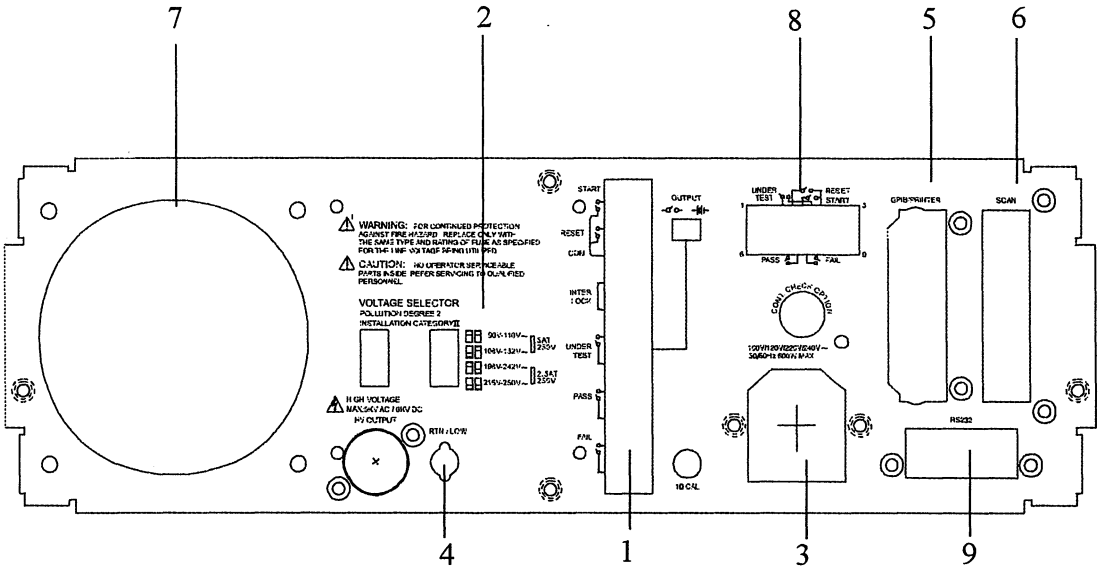
Function Keys: Function key. Under different display menus, there are different functions. The right side of display has corresponding function description. If the description is blank, it means corresponding function key is invalid.

■ **Terminal Area**

OUTPUT : High electric potential terminal of high voltage output. This terminal is belong to high electric potential output, usually is high voltage output. Therefore, this terminal is very dangerous. Don't touch it when DANGER LED is light, there is high voltage outputting.

RTN / LOW : The common test terminal. It's a reference terminal when high voltage test, it also a low electric potential terminal. This terminal is almost equal to cover grounding terminal.

4.2 Rear Panel Description



1. **REMOTE I/O** : The test result signal output terminal.

   START : Start test signal input terminal.

   STOP : Stop test signal input terminal.

   INTER LOCK : Output only when this two terminals are short circuit and high voltage.

   UNDER TEST : When the tester is under test status, this output terminal will short circuit. Control external signal by using this short condition. The junction specification 115V AC current is lower than 0.3A action time. This tester is under testing status until STOP is stopped.

   PASS : When the tester judge DUT is PASS, this output terminal is short circuit. Control external signal by using this short circuit condition. The junction specification 115V AC current is lower than 0.3A. The action time is 0.2sec ~ 99.9sec. (Can be set)

   FAIL : When the tester judge DUT is FAIL, this output terminal will be short circuit. Control external signal by using this short condition. The junction specification 115V AC current is lower than 0.3A. The action time: From judging FAIL to STOP is stopped.

2. **VOLTAGE SELECTOR Input Power Supply Range Switch**

   Changing the tester inputted AC power. Using AC power has four kinds as below.

a. 90 ~ 110V AC
b. 108 ~ 132V AC
c. 198 ~ 242V AC
d. 218 ~ 250V AC

Switching this power switch by applying AC power and notice the change of fuse.

3. **AC LINE** : AC power socket and fuse holder.
   A tri-cord power and fuse holder. Input AC power, which the tester is needed from AC power socket. The detailed specification of using fuse please refers "Chapter 3 - Notice Items Before Using" or descriptions of rear panel in this manual.

4. **RTN/LOW**: Safety GND terminal. Please use adaptable implement to connect this grounding terminal actually. If there is no grounding actually, the circuit with GND terminal or other instruments connecting cable with GND terminal is short circuit. The cover of tester may exist high voltage. This is very dangerous, anyone touch the tester under the above status may cause damage. Therefore, it is necessary to connect safety GND terminal to ground.

5. **GPIB INTERFACE (Option)**
   This socket is for optional GIPB interface (IEEE-488-1978). The detailed descriptions, please refers "Chapter 5 - Description of GPIB Interface" in this manual.

6. **OPTION**: This socket is the option PRINTER interface for the tester. The detailed descriptions please refer chapter 8 of this manual.

7. **FAN :** The temperature control fan.
   When the temperature reaches 50°C, fan opens automatically. When the temperature is lower than 45°C, fan stops automatically.

8. **9 Pin D Connector**
   All of 9 pin D-Sub connector functions are the same as (1) Remote I/O.

9. **RS232 Interface**
   This socket is the standard RS232 interface for the tester. GPIB and RS232 interface can't use simultaneously.

4.3 Notice Items and Procedures before Operation

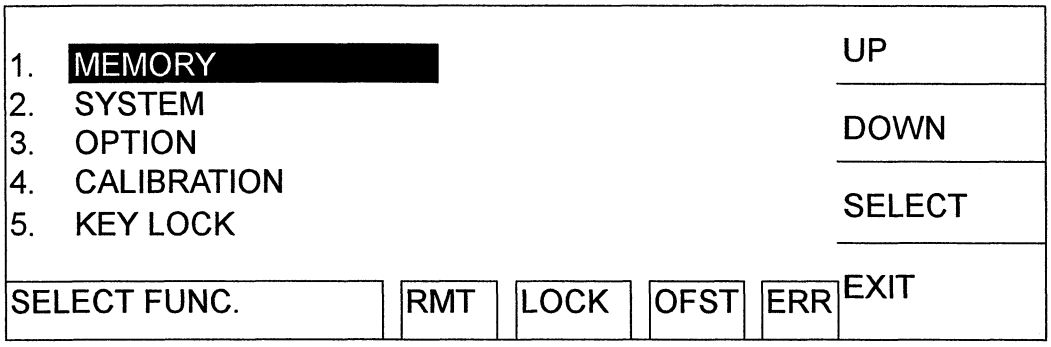
1. Before plugging AC power cable, please confirm power that use firstly and description of rear panel is match or not and power switch is OFF status.
2. Before turning on power, please peruse "Chapter 3 - Notice Items Before Using" and remember it.

3. When turns on power, the tester will self-test. If there is abnormal condition, please turns off switch and pulls off power cord immediately.

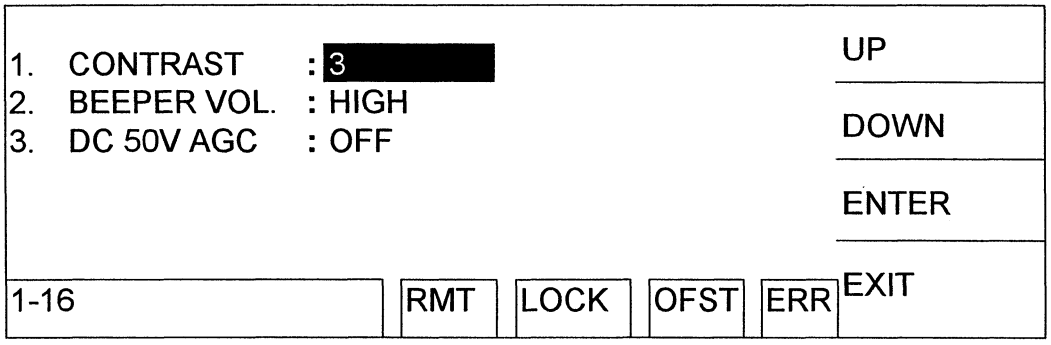
4.4 System Parameter Setting

4.4.1 How to Enter System Parameter Setting Menu

1. Under power on menu, press Function Key MENU the menu as the following:



2. Move the highlighted to "SYSTEM" by Function Key UP, DOWN. Press Function Key SELECT to enter system parameter setting menu is shown as the following:



4.4.2 Operation Methods

1. After entering system parameter setting menu, press Function Key ENTER to move the highlighted to the parameter item, which want to set.

2. Press Function Keys UP, DOWN to set this item parameter data.

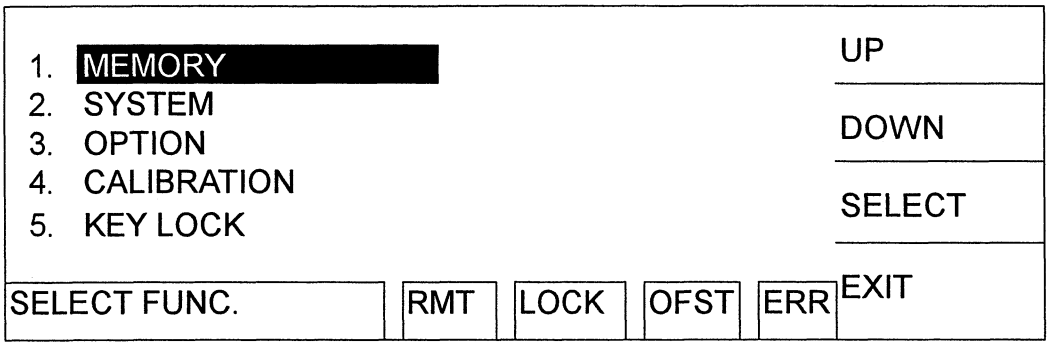
Setting Item	Range	Initial Setting	Description
Contrast	1~16	7	Adjust LCD brightness
Beeper Vol.	LOW / MEDIUM / HIGH / OFF	HIGH	Adjust buzzer volume
DC 50V AGC	ON/OFF	ON	When set above DC 50V, hardware automatic gain compensation function is open or not.

System parameter setting data description table

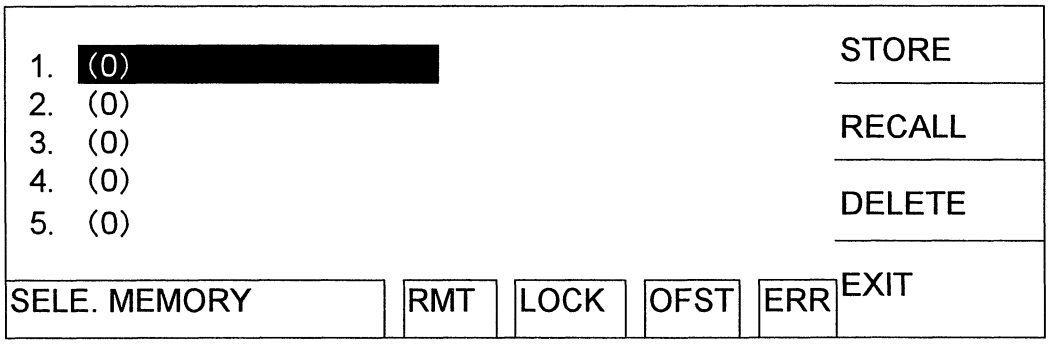
4.5 Test Parameter and Memory Management of Test Preset Parameter

4.5.1 How to Enter Memory Management Menu

1. Under power on menu, press Function Key MENU the menu as the following:



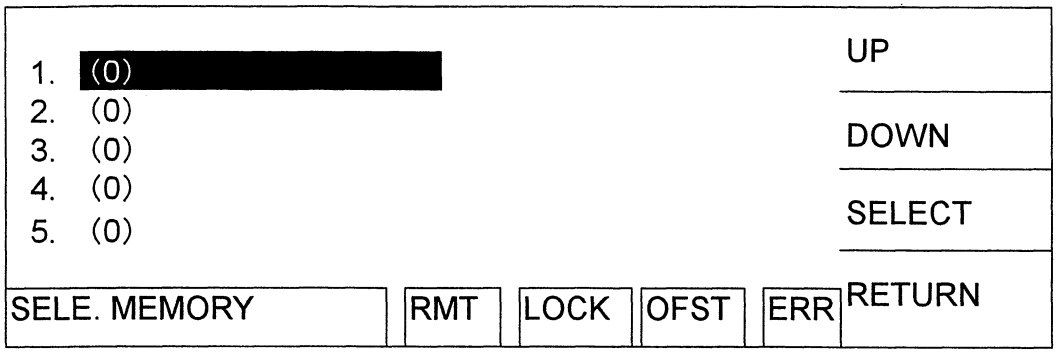
2. Move the highlight to "MEMORY" by Function Key UP, DOWN. Press Function Key SELECT to enter Memory management mode is shown as the following:



3. At this time, can read, store or delete this set memory by Function Key.
4. The value within ( ) means this set memory included test procedure number.

4.5.2 How to Select a Set of Memory

1. When the state list shows "SELECT MEMORY", move the highlighted to the memory which want to manage by Function Key UP, DOWN. Press Function Key SELECT is shown the following menu:



2. At this time, follows Function Key instructions to read, store or delete this set of memory.

4.5.3 Delete Memory

If you want to delete test parameter data which be stored in memory, please follows the below procedures to process.

1. Press Function Key DELETE when status bar shows [SELECT FUNC.].
2. Select the test parameter data of memory, which want to delete by using Function Key UP, DOWN. Press Function Key DELETE and then show delete confirm window.
3. Press Function Key YES to confirm or press Function Key NO to cancel.

4.5.4 Read Memory

If there are many sets of test parameter values which be saved in main memory. Follow the below procedures to recall test parameter.

1. Press Function Key RECALL when status bar shows [SELECT FUNC.].
2. Select the test parameter data of memory, which want to read by using Function Key UP, DOWN.
3. Press Function Key SELECT and then show confirm window.
4. Press Function Key YES to confirm or press Function Key NO to cancel.

4.5.5 Store Memory

If you want to save test parameter data which be set in the memory. Please follows the below procedures to process.

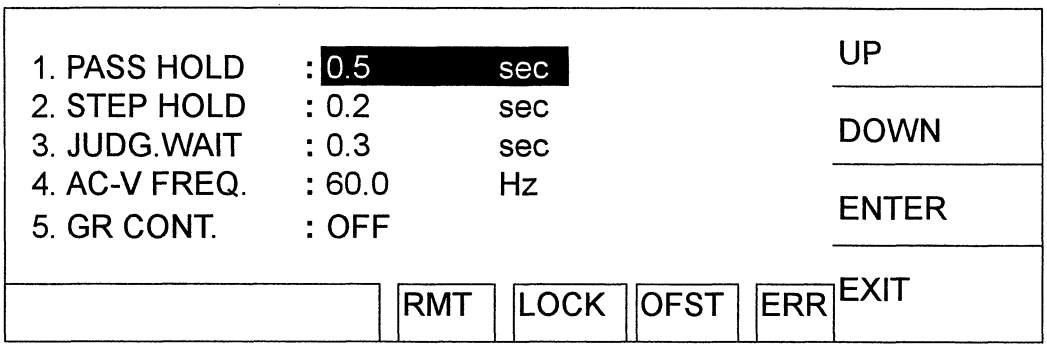
1. When status bar shows [SELECT FUNC.], press Function Key STORE.
2. Selecting the memory want to store by using Function Key UP, DOWN. Press Function Key SELECT, the cursor become underscore blinking cursor.
3. At this time, input the memory name by using Function Key UP, DOWN.
4. By using Function Key ENTER to move the underscore blinking cursor to next character.
5. If press Function Key ENTER twice then will show a read confirmation window.
6. Press Function Key YES to confirm or press Function Key NO to cancel.
   (*Note*: If there is covered data in the memory name, please be careful to confirm before

storing.)

4.6 Preset Parameter Setting

4.6.1 How to Enter Testing Preset Parameter Setting Menu

Under power on menu, press Function Key PRESET to enter testing preset parameter setting menu as the following.



4.6.2 Operation Methods

1. After entering test preset parameter setting menu, press ENTER key move the highlighted cursor to the parameter item, which want to set.
2. Press Function Keys UP or DOWN to set this item parameter data.

Testing preset parameter function description table:

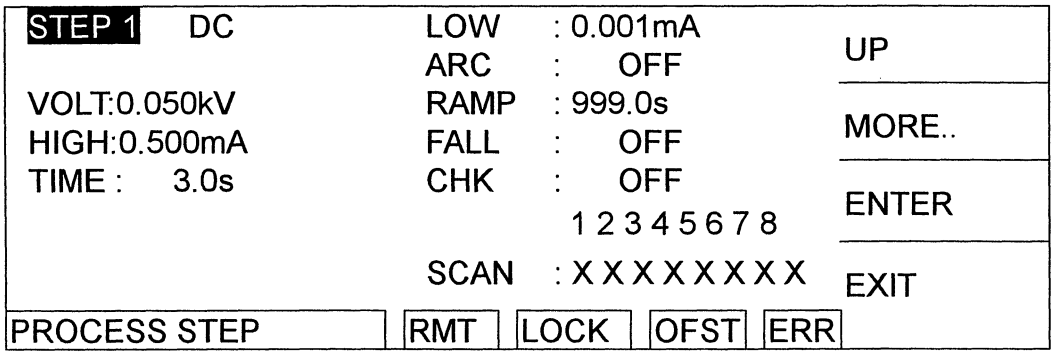
Setting Item	Range	Initial Setting	Description
Pass Hold	0.2 ~ 99.9	0.5	Set the rear panel GOOD signal output continuous time
Step Hold	0.1 ~ 99.9 / KEY	0.2	Set interval time between test procedures. Key: Set test procedure is interrupted (Please press [START] to continue when test stop.)
Judg. Wait	0.1 ~ 99.9	0.3	Set no judgment time
AC-V Freq.	50/ 60	60	Set output voltage frequency when AC withstand voltage testing.
GR Cont.	ON/OFF	OFF	Set ground on test FAIL function is open or not.
Soft. AGC	ON/OFF	ON	Set software automatic gain compensation function is open or not.
Auto Range	ON/OFF	OFF	Set withstand voltage auto-range function

			is open or not.
GFI	ON/OFF	ON	Set ground fail interrupt function
FAIL CONT.	ON/OFF	OFF	After setting FAIL, if still continue to test next procedure or not.
SCREEN	ON/OFF	ON	Set if show test screen.
SMART KEY	ON/OFF	OFF	Set if open parameter memory function.
Part No.	Not over 13 characters	None	Set the product Part No.
Lot No.	Not over 13 characters	None	Set the product Lot No.
Serial No.	Not over 13 characters	None	Set the product serial no. format, * means changeable character.

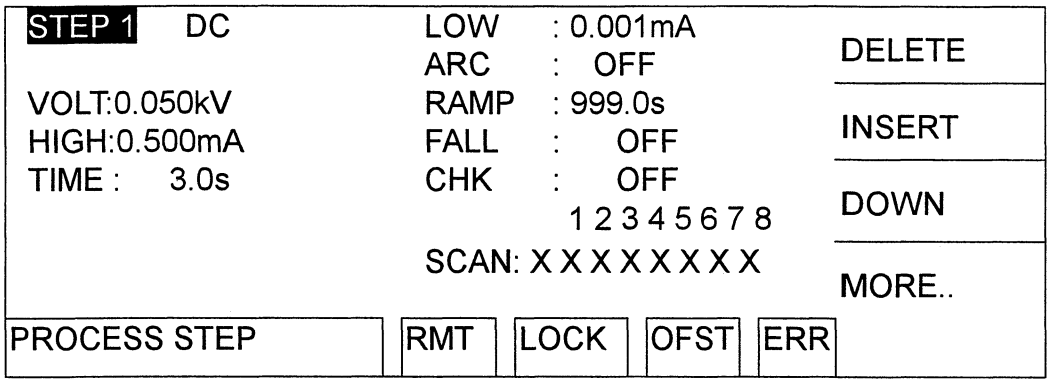
4.7 PROGRAM Setting

4.7.1 Test Procedure Setting

1. Under power on menu, press Function Key PROGRAM and then enter PROGRAM setting menu as the following:



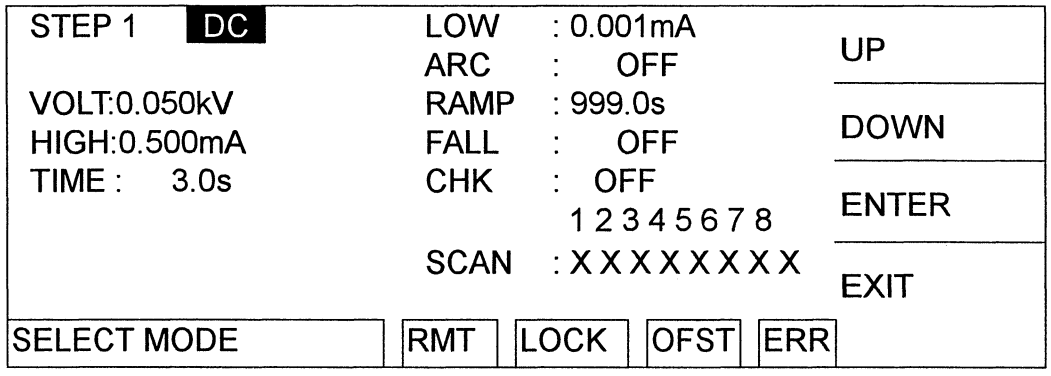
2. After entering PROGRAM setting menu, use Function Keys UP select the test procedure want to set, the range is 1~50.
3. Press ENTER key move the highlighted cursor to the parameter item, which want to set.
4. Press Function Key MORE.. can switch to other setting menu as the following.



5. By using Function Keys DOWN to decrease test procedure which you want to set, the range is 1~50.
6. Press Function Keys DELETE, INSERT can delete, insert a test procedure.
7. Press Function Key MORE.. can return to PROGRAM setting menu to continue setting others test parameter.

4.7.2 Select Test Mode

1. After entering PROGRAM setting menu, press ENTER key to move the highlighted cursor to the following position.



2. Use Function Key UP, DOWN to select test mode. There are AC / DC / IR test modes can be selected (WT-8751 only AC/DC). Different test modes have different test parameter can be set.

4.7.3 SMART KEY Operation Methods

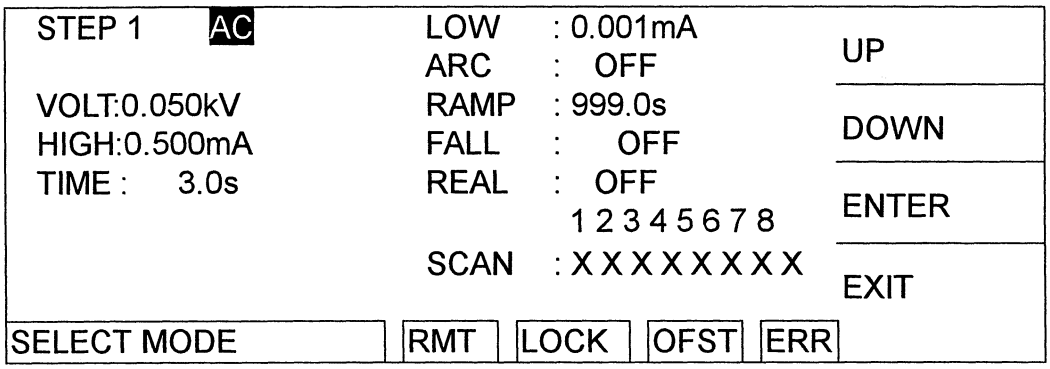
1. When starts SMART KEY function of PRESET parameter in each test, it records the test parameters. The test parameter includes: withstand test needed voltage, the high limit value of leakage current, needed test time, the low limit of leakage current, the high limit of electric arc, needed rise time to setting voltage, the high limit of real leakage current, scanning selection point. Each parameter can store ten sets of value.

2. After entering PROGRAM setting screen, press ENTER key continuous for one second then will show S-KEY word on the lower left side of screen. At this time, the adjustment function of UP and DOWN keys is disabled and read back the previous test parameter. If want to recover the adjustment function of UP and DOWN keys, press ENTER key continuous for one second until S-KEY word on the lower left side of screen is disappeared.

4.7.4 Each Parameter Setting Data Description

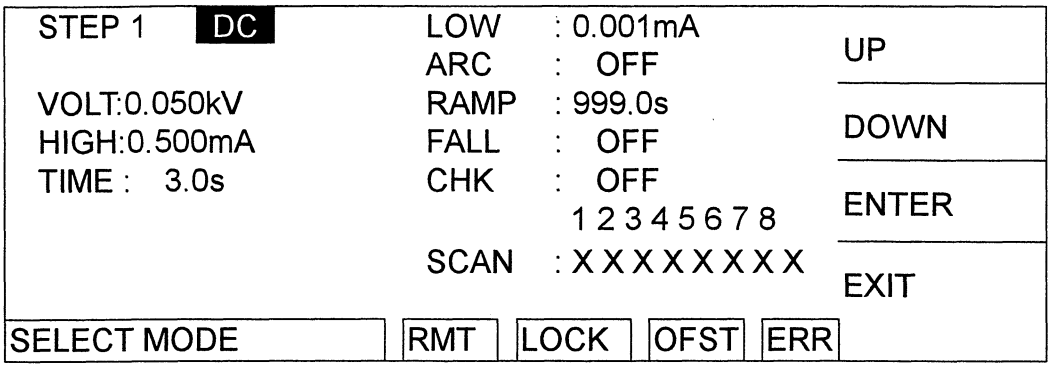
The following described parameter setting data of each test mode.

AC withstand voltage test mode



VOLT : Setting withstand voltage test needed voltage.
HIGH : Setting leakage current high limit value.
TIME : Setting test needed time, input 0 means continuous test.
LOW : Setting leakage current low limit value, input 0 means OFF.
ARC : Setting arc high limit, input 0 means OFF.
RAMP : Step-up setting voltage needed time, input 0 means OFF.
FALL : The needed time is from setting voltage value to zero, 0 means OFF.
REAL : Setting real leakage current high limit value, input 0 means OFF.
SCAN : Setting scan test selection point.

DC withstand voltage test mode



VOLT : Setting withstand voltage test needed voltage.

HIGH : Setting leakage current high limit value.

TIME : Setting test needed time, input 0 means continuous test.

LOW : Setting leakage current low limit value, input 0 means OFF.

ARC : Setting arc high limit, input 0 means OFF.

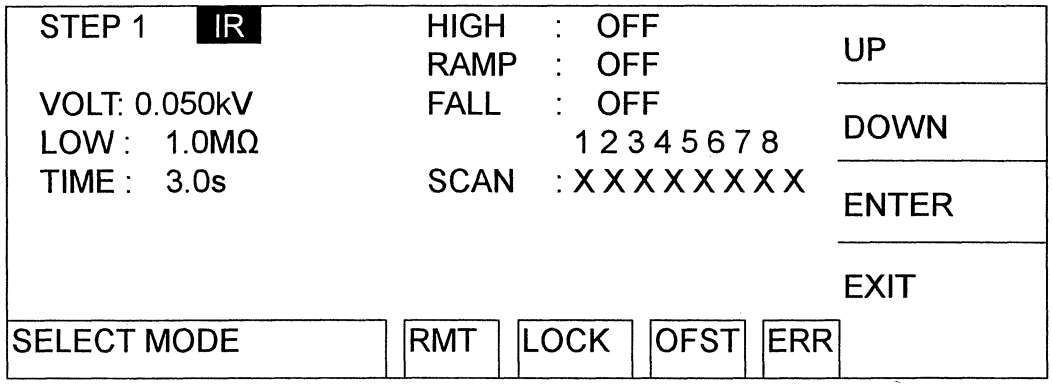
RAMP : Step-up setting voltage needed time, input 0 means OFF.

FALL : The needed time is from setting voltage value to zero, 0 means OFF.

CHK : Select detect charge current over low (CHECK LOW)

SCAN : Setting scan test selection point.

IR Insulation resistance test mode



VOLT : Setting insulation resistance test needed voltage.

LOW : Setting insulation resistance low limit value.

TIME : Setting test needed time, input 0 means continuous test.

HIGH : Setting insulation resistance high limit value, input 0 means OFF

RAMP : Step-up setting voltage needed time, input 0 means OFF.

FALL : The needed time is from setting voltage value to zero, 0 means OFF.

SCAN : Setting scan test selection point.

4.8 How to Process Test

4.8.1 Offset Value Calibration Confirmation of Test Cable

1. Under power on menu, press Function Key MORE.. to enter multi sets of STEPS test menu.
2. Press Function Key OFFSET, the display will show a menu indicate the user open the output terminal.
3. After pressing START key, DANGER LED on front panel is light up. When test time is end and PASS indicator is light up, meanwhile Offset block is also highlighted. This means the tester zeroed the test cable and test lead.

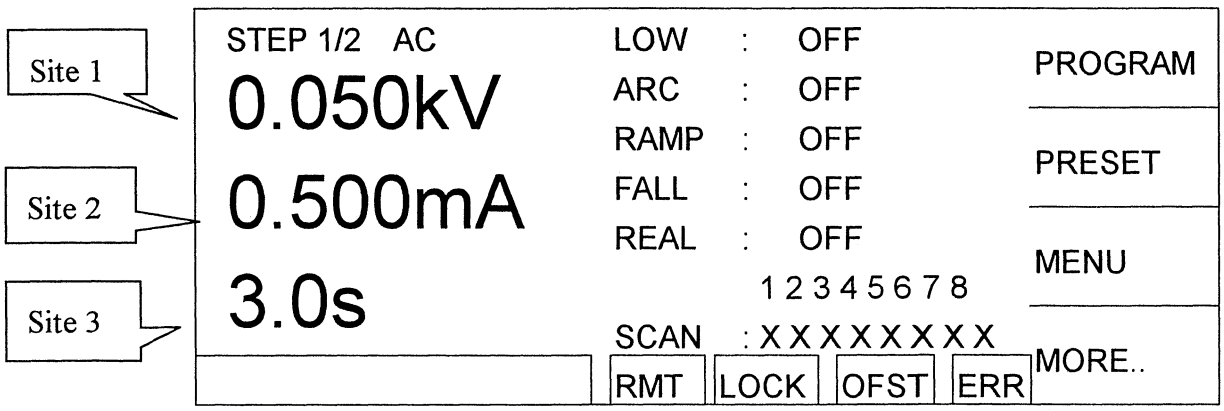
4.8.2 Connecting DUT Methods

Withstand voltage / Insulation resistance test mode (AC / DC / IR)

First of all, confirms there is no voltage output and DANGER LED isn't light. And then connecting test cable (black) of low electric potential to RTN / LOW terminal of the main unit and fix on the fixture. This test cable and high voltage output terminal short-circuited and confirms there is no high voltage output. At the same time, high voltage test cable (red or white) plug in high voltage output terminal OUTPUT. Connecting the test cable of low electric potential to DUT firstly, and then connecting the test cable of high electric potential to DUT.

4.8.3 Test Procedure

1. Connection is completed correctly by connecting DUT device method.
2. Under power on menu (as the following figure):



Schema:

STEP 1/2 means there are 2 test procedures in total and now executing the first test procedure. AC means test mode. "Site 1" means setting voltage value, "Site 2" means

setting current high limit, "Site 3" means test time. The test results are showing on status list.

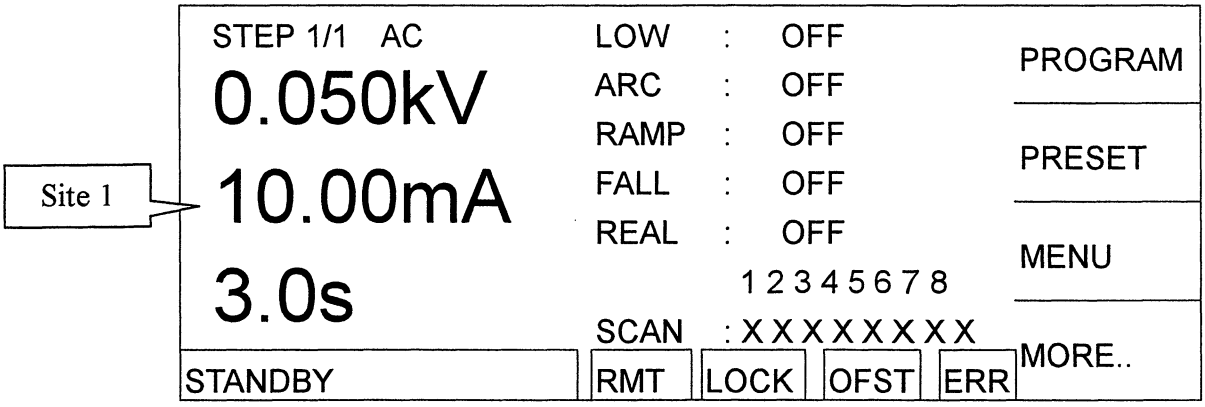
3. Please press STOP key, ready for testing, the status list show "STANDBY".
4. Press START key to start test.
   When press this key, start voltage output. At the same time, DANGER LED will be lighted, the status list shows "UNDER TEST". Warning: Now test status is with output voltage. "Site 1" will show output voltage output value; "Site 2" will show current reading. "Site 3" the timer is counting down simultaneously.
5. GOOD judgment
   When all of test statuses are been tested and the result shows PASS, then main unit is judged as GOOD and cut off output. The rear panel output PASS signal, the buzzer function simultaneously.
6. No good judgment
   If the measurement value is abnormal, the main unit is judged as FAIL and stop output immediately. The rear panel output FAIL signal, the buzzer function simultaneously. Keep on function until STOP key of main unit be pressed. The test result will show no good status.

Test result	Meaning
HI	Measurement current / Resistance value over high limit
LO	Measurement current / Resistance value over low limit
ARC	Current arc over high limit
CHECK LOW	Charging current over low
ADV OVER	Voltage / current reading over hardware valid digit.
ADI OVER	Current / resistance reading over hardware valid digit.
GR CONT.	Grounding on test no good
GFI TRIP	Ground fail interrupt
AC REAL HI	Real current measurement value over high limit

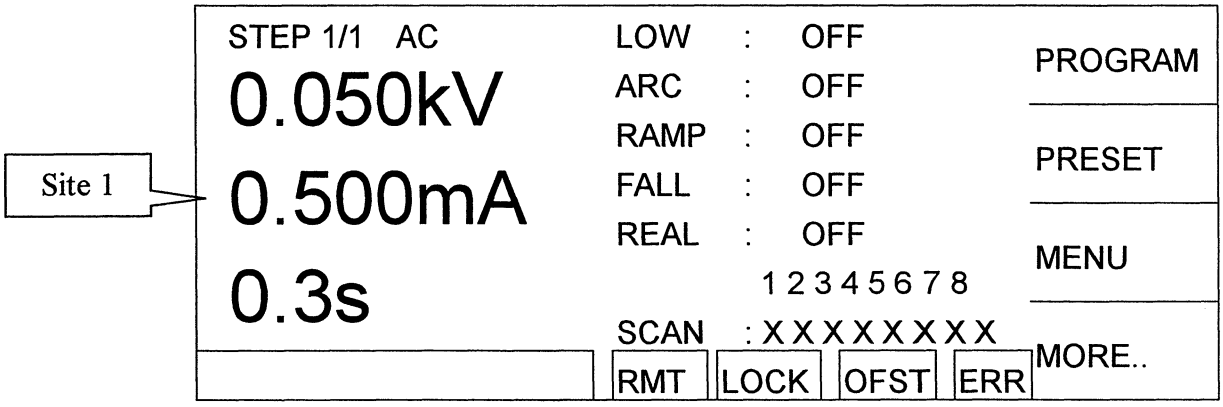
※ Under any circumstances only need to press STOP key if want to stop test output.

4.8.4 Auto Range

1. Set Auto Range as ON.
2. Set the range to high current as the Site 1 shown in the following menu.



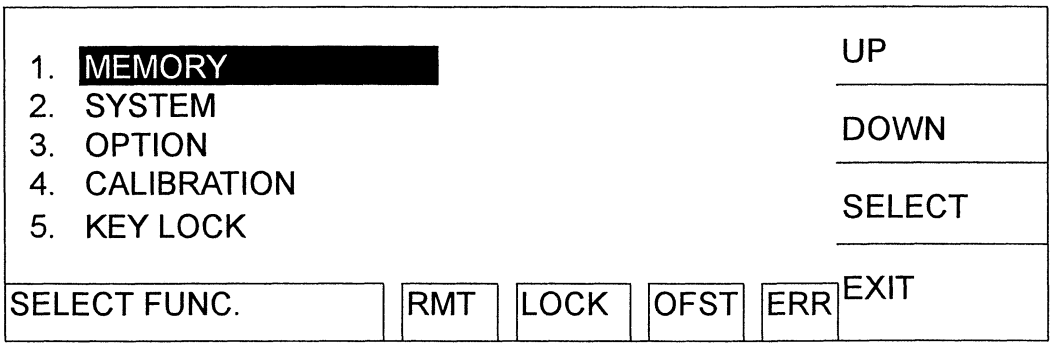
3. Before ending the test previous 0.6 sec., the tested current is shown and auto range to low current as the Site 1 in the following menu.



4.9 KEY LOCK Function

4.9.1 KEY LOCK Setting Method

1. Under power on menu, if "LOCK" text block isn't highlighted then can set KEY LOCK function.
2. Press Function Key MENU then show the following menu:

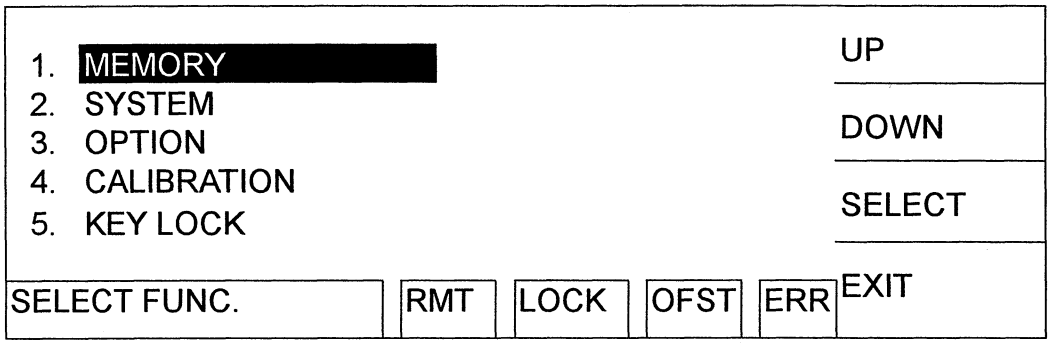


3. Move the highlighted to "KEY LOCK " by using Function Keys UP, DOWN. Press Function Key SELECT to enter KEY LOCK setting menu.

4. Using Function Keys A, B to input PASSWORD (please input AAAA, when PASSWORD is not set).
5. Press ENTER key will show selection window, "LOCK" text block will show highlighted. The user can use Function Keys YES, NO to select whether LOCK MEMORY RECALL function together or not.
6. Press Function Keys EXIT to complete KEY LOCK function.

4.9.2 KEY LOCK Release Method

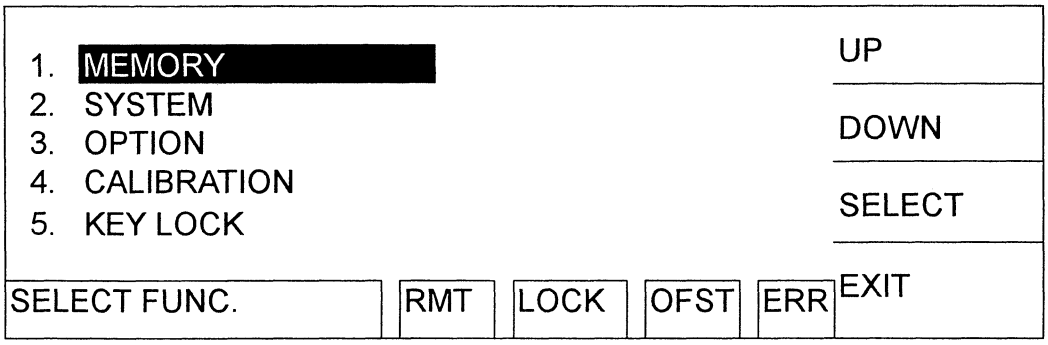
1. Under power on menu, if "LOCK" text block is highlighted then can release KEY LOCK function.
2. Press Function Key MENU then show the following menu:



3. Move the highlighted to "KEY LOCK" by using Function Keys UP, DOWN. Press Function Key SELECT to enter KEY LOCK release menu.
4. Using Function Keys A, B to input PASSWORD (please input AAAA, when PASSWORD is not set).
5. Press Function Key ENTER key, "LOCK" text block will release the highlighted. It means KEY LOCK function is released.

4.10 Setting User Password

1. Under power on menu, press Function Key MENU then show the following menu:



2. Move the highlighted to "CHANGE PASSWORD" by using Function Keys UP, DOWN. Press Function Key ENTER to enter password input menu.

3. Using Function Keys A, B to input PASSWORD (please input AAAA, when PASSWORD is not set). Press ENTER key will show "ENTER NEW PASSWORD" window.

4. Using Function Keys A, B to input NEW PASSWORD (not over ten characters), press ENTER key will shows "ENTER CONFIRM PASSWORD" window.

5. Using Function Keys A, B to input CONFIRM PASSWORD (the same as NEW PASSWORD), press ENTER key. At the same time, the setting has been done and can press EXIT to exit.

4.11 Remote Control

This tester has REMOTE socket of remote switch on rear panel. When you want to control this tester by external signal, plug the control cable in the socket. Please don't touch high voltage terminal or it may cause dangerous. Remote control by high voltage test bar usually. Can use other control circuit instead of high voltage bar. Please notice that is switch of controlling high voltage output. Be careful that the control cables don't close high voltage terminal and test cables to avoid dangerous.

1. If want to control START single and STOP signal can refer to *figure 4-5*. As this figure described method connect to REMOTE position on front panel.

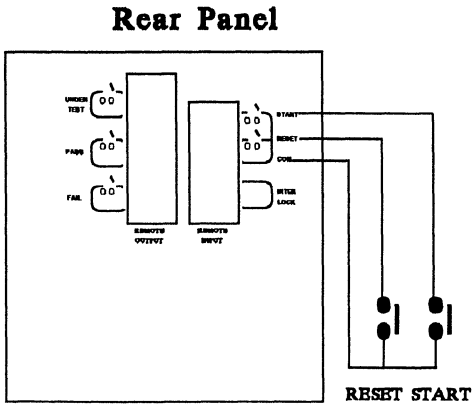


Figure 4-5

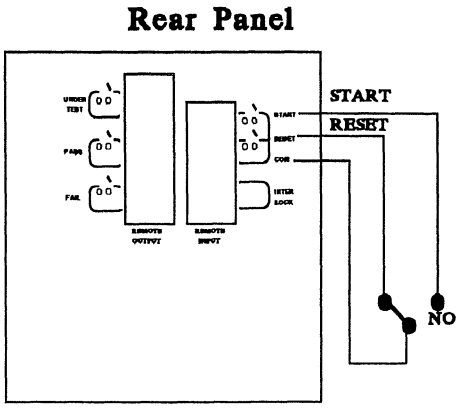


Figure 4-6

2. As figure 4-6, the main unit is under STOP status. NC point is connecting to STOP and NO point connecting to START.

3. Some logical components such as transistor, FET, coupler. Also can be used to connect as control circuit as figure 4-7. The connecting signal and circuit as figure 4-7. Only the circuit includes the following statuses, it can control the main unit.
   (1) The signal of LOW flows current is 2mA or less.
   (2) The action time of inputting signal should over 20mS.

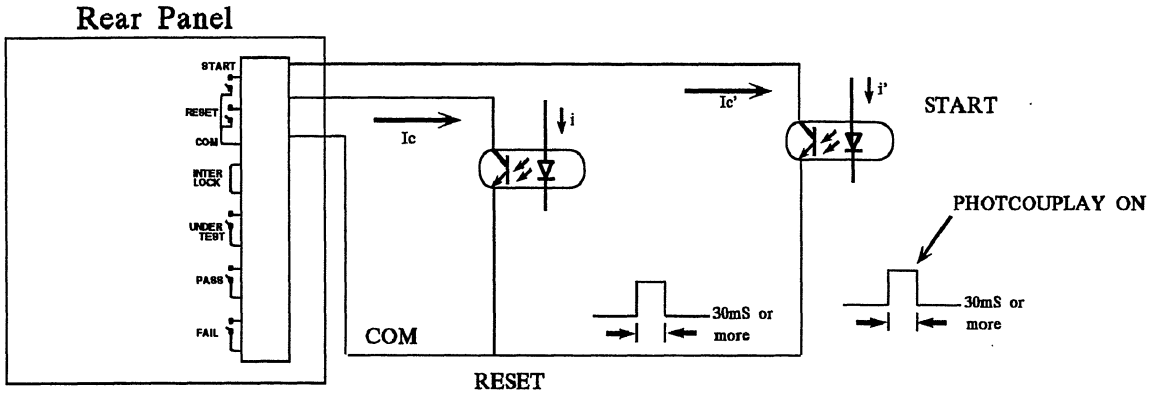


Figure 4-7

4. The relay switch control as figure 4-5 and photo-coupler control as figure 4-7 are controlled by component contact. It is effective to avoid error operation system cause by interference. Although the main unit has a lot of preventions, it is necessary to be careful that interferences result from setting measurement system.

5. Pin diagram of REMOTE CONTROL as figure 4-8. When you want to control by external, please remember this pin diagram.

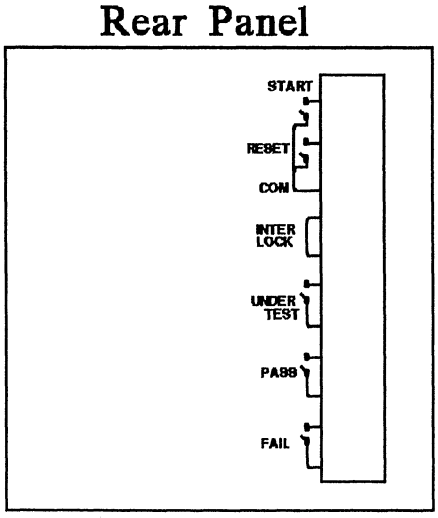


Figure 4-8

4.12 Output Signal

The tester includes LED and buzzer two kinds of indication signal. The rear panel of tester has the following output signals.

UNDER TEST : When the analyzer is under test, the output terminal will short circuit. Can use this short condition to control external signal. The junction specification 115V AC current is lower than 0.3A.

PASS : When the tester judge DUT is good, the output terminal will short circuit. Can use this short circuit condition to control external signal. The junction specification 115V AC current is lower than 0.3A.
The action time is 0.2sec ~ 99.9sec. can be set.

FAIL : When the tester judge DUT is no good, the output terminal will short circuit. Can use this short circuit condition to control external signal. The junction specification 115V AC current is lower than 0.3A.
The action time : from judge as no good to STOP is stopped.

4.13 Scan Test

The tester multipoint scans on DUT (only WT-8753) for more faster and effective test.
Setting method:

1. Enter test parameter setting menu and setting test parameter in sequence.
2. When the highlighted position on "SCAN", press Function Key MOVE can select the output channel want to set. (WT-8753: 1 ~ 8)
3. At the same time, can use Function Key CHANGE to set the status of scanning test output terminal. Press this key will shows "H", "L" and "X" in sequence, it means do output from High Channel ; do output and don't output from Low Channel.
4. Setting is completed, press Function Key ENTER to confirm and exit.

5. GPIB Operation Description (Option)

5.1 Guide

The user can use computer by GPIB (IEEE 488-1978) interface to remote control and data transfer.

5.2 Interface Specification

5.2.1 Adaptable Standard

IEEE488-1978 standard

5.2.2 Interface Capability

Code	Meaning
SH1	Source Handshake Equipped with source handshake interface function
AH1	Acceptor Handshake Equipped with acceptor handshake interface function
T4	Basic Talker requirement Equipped with basic talker interface function
L4	Basic Listener requirement Equipped with basic listener interface function
SR1	Service request requirement Equipped with service request interface function
RL1	All remote/local requirement Equipped with remote/local interface function
PP0	No Parallel poll requirement No parallel poll interface function
DC1	All device clear requirement Equipped with device clear interface function
DT0	No Device trigger requirement No device trigger interface function
C0	No controller requirement No controller interface function

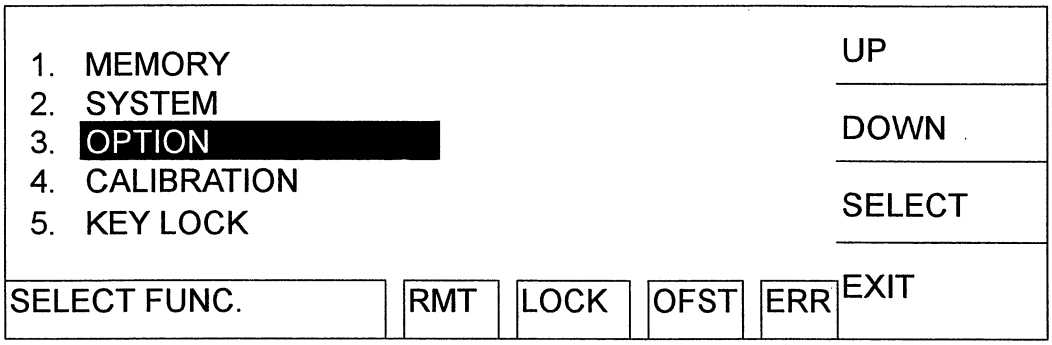
5.2.3 Using Code

ASCII code

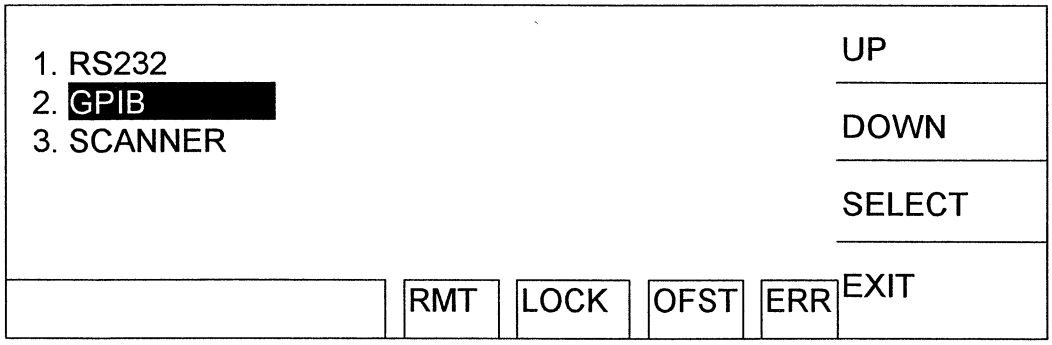
5.3 GPIB Related Panel Descriptions

5.3.1 Address Setting

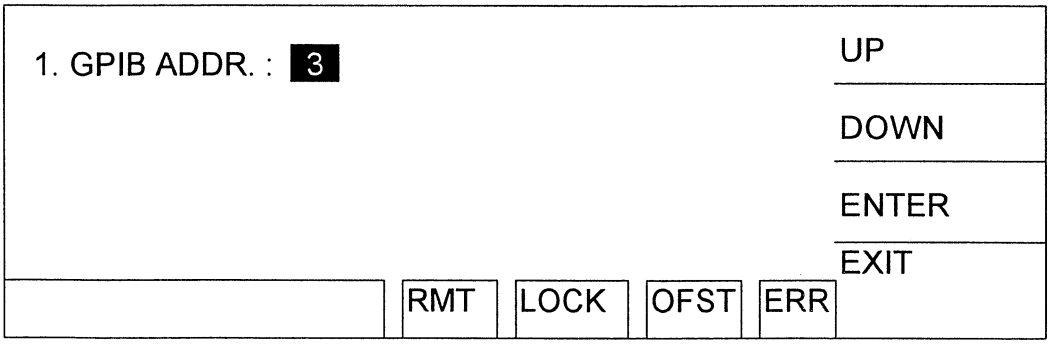
1. Under power on menu, press Function Key MENU as the following:



2. Move the highlight to "OPTION" by Function Key UP, DOWN. Press Function Key SELECT to enter OPTION select setting as the following:



3. Move the highlighted to "GPIB" by Function Key UP, DOWN. Press Function Key SELECT to enter GPIB setting menu as the following:



4. Then select GPIB Address by Function Key UP, DOWN.

5. The setting is completed, press Function Key EXIT to exit.

5.3.2 Remote / Local

1. The signal block Remote is highlighted, it means the analyzer is on Remote status.
2. On Remote status can use LOCAL key on panel switch the analyzer to Local status.
3. On Remote status, all of panel keys are malfunction except for Function Key LOCAL (switch to Local) MENU, MORE, and STOP (reset instrument) keys.
4. By using LLO [Local lockout] command of GPIB makes LOCAL key is malfunction.

5.4 Interface Message

The analyzer is capable of responding to the following messages

Signal	Meaning	Response
GTL	Go To Local	Can switch the analyzer to Local status
SDC	Selected Device Clear	Restart the analyzer
LLO	Local Lockout	From LOCAL key switch to Local status is forbidden
IFC	Interface Clear	Reset GPIB interface

5.5 GPIB Control / Setting Command Descriptions

The analyzer GPIB function composed command string is inputted by ASCII code to attain functions of remote control and setting. The length of the command string is limited in 1024 characters (include end code) [Command + Parameter] compose a command. Two commands can be connected by semicolon and end by ending code. The end code are the following types, the analyzer can distinguish it by self.

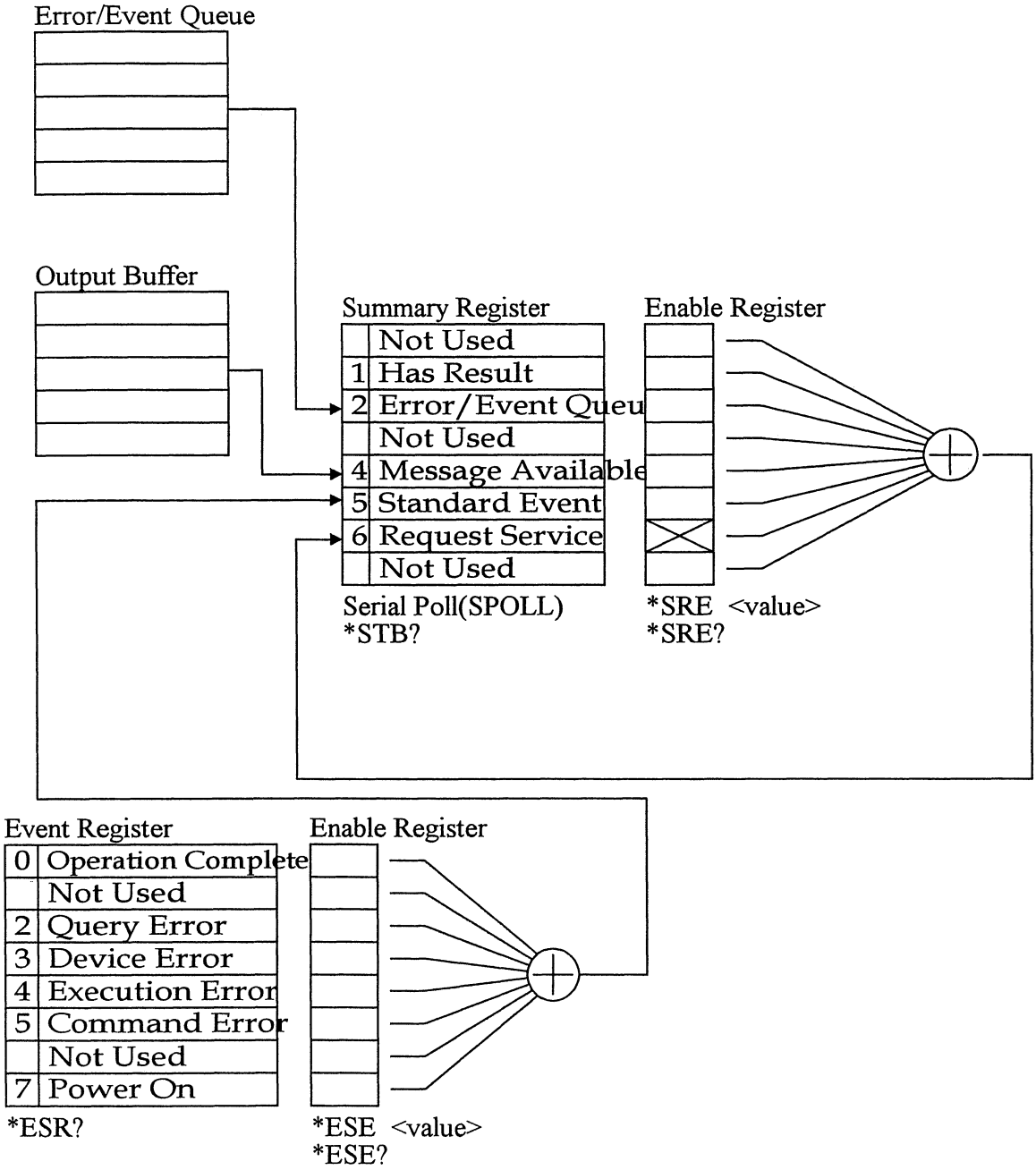
End code

LF
CR+LF
EOI
LF+EOI
CR+LF+EOI

Status response command

✳CLS
✳ESE *<enable value>*
✳ESE?
✳ESR?
✳SRE *<enable value>*
✳SRE?
✳STB?

*PSC 0|1
*PSC?



5.6 IEEE 488.2 Command

* CLS command
  Clear status data configuration the following actions are needed.
  Clear standard event status register.
  Clear status bit group register except for MAV bit (bit 4).

* ESE <*metric system value*> Command

Use setting standard event status enable register value, <metric system value> range is 0 ~255.

* ESE? Command

The controller is used for query standard event status of device enable register value.
The output format is <metric system value>, its' range is 0 ~255.

* ESR? Command

The controller queries the standard event register value of the device. After performing this command, the standard event register value will be cleared to 0.
The output format is <metric system value>, its' range is 0 ~ 255.

* SRE <metric system value> Command

Use for setting service request register value, its' <metric system value> value is 0 ~ 255.

* SRE? Command

The controller is reading service request enable register initial setting.
The output format is <metric system value>, its' range is 0 ~255.

* STB? Command

The controller is for reading status bit register value.
The output format is <metric system value>, its' range is 0 ~255.

* OPC Command

Operation is completed command

* OPC? Command

Operation complete query command.
The output format is ASCII character " 1 ".

* PSC 0|1 Command

Power on status clear command.

* PSC? Command

Power on status clear query command.
The output format is ASCII character " 1 " or " 0 ".

* RST Command

The device reset command.

* IDN? Command

The controller is for reading the basic data of the device.

The output format separate four fields by comma, it denote separately: manufacturer, device model, serial number, firmware version.

* SAV <metric system value> Command

Save command.

This command is save the current status to memory, its' metric system value range is 1 ~ 99.

* RCL <metric system value> Command

Recall command.

This command is recall the saved status, its' metric system value range is 1 ~ 99.

5.7 Remote Command Summary

SCPI command

The parameter syntax format of SCPI command includes the following.
Dual arrow symbol "< >" denote the defined parameter of SCPI command standard.
"< numeric _ value >" is metric system value, "< boolean >" is Boolean equation data and its' value is 0 or 1. Vertical line " | " denotes OR parameter.

: SYSTem
: ERRor
: [NEXT]?
: VERSion?
MEMory
: DELete
: LOCAtion <numeric_value>
: FREE
: STEP?
: STATe?
: STATe
: DEFine
: DEFine?
: NSTAtes?

: SOURce
: SAFEty
: FETCh? *[< item >] { , < item > }*
: STARt
[: ONCE]
: OFFSet GET|OFF
: OFFSET?
: STOP
: STATus?
: RESult
: ALL
[: JUDGment]?
: OMETerage?
: MMETerage?
: RMETerage?
: TIME
[: ELAPsed]
[: TEST]?
: RAMP?
: MODE?
: COMPleted?
: AREPort? (RS232 Interface only)
: AREPort <Boolean> | ON | OFF(RS232 Interface only)
[: LAST]
[: JUDGment]?
: OMETerage?
: MMETerage?
: RMETerage?
:STEP<n>
: JUDGment]?
: OMETerage?
: MMETerage?
: RMETerage?

: SNUMber?
: STEP<n>
: DELete
: SET?

: MODE?
: AC
[: LEVel] <numeric_value>
[: LEVel]?
: LIMit
[: HIGH] <numeric_value>
[: HIGH]?
: LOW <numeric_value>
: LOW?
: ARC
[: LEVel] <numeric_value>
[: LEVel]?
: REAL
[: HIGH]
[: HIGH]?
: TIME
: RAMP <numeric_value>
: RAMP?
[: TEST] <numeric_value>
[: TEST]?
: FALL <numeric_value>
: FALL?
: CHANnel
[: HIGH] <channel_list>
[: HIGH]?
: LOW <channel_list>
: LOW?
: DC
[: LEVel] <numeric_value>
[: LEVel]?
: LIMit
[: HIGH] <numeric_value>
[: HIGH]?
: LOW <numeric_value>
: LOW?
: ARC
[: LEVel] <numeric_value>
[: LEVel]?

: CLOW <boolean>|ON|OFF
: CLOW
: TIME
: RAMP <numeric_value>
: RAMP?
[: TEST] <numeric_value>
[: TEST]?
: FALL <numeric_value>
: FALL?
: CHANnel
[: HIGH] <channel_list>
[: HIGH]?
: LOW <channel_list>
: LOW?
: IR
[: LEVel] <numeric_value>
[: LEVel]?
: LIMit
: HIGH <numeric_value>
: HIGH?
[: LOW] <numeric_value>
[: LOW]?
: TIME
: RAMP <numeric_value>
: RAMP?
[: TEST] <numeric_value>
[: TEST]?
: FALL <numeric_value>
: FALL?
: CHANnel
[: HIGH] <channel_list>
[: HIGH]?
: LOW <channel_list>
: LOW?
: PRESet
: TIME
: PASS <numeric_value>
: PASS?

: STEP <numeric_value>|KEY
: STEP?
: JUDGment <numeric_value>
: JUDGment?
: AC
: FREQuncy <numeric_value>
: FREQuery?
: WRANge
[: AUTO] <boolean>|ON|OFF
[: AUTO]?
: AGC
[: SOFTware] <boolean>|ON|OFF
[: SOFTware]?
: GFI
[: SWITCH] <boolean>|ON|OFF
[: SWITCH]?
: FCONtinuity <boolean> |ON|OFF
: FCONtinuity
: GR
: CONTinue <boolean>|ON|OFF
: CONTinue?
: FCONtinuity <boolean> |ON|OFF
: FCONtinuity
: NUMber
: PART
: PART?
: LOT
: LOT?
: SERIal
: SERIal?

: SYSTem

: VERSion?

: SYSTem: VERSion?

This command queries the SCPI version of this device.

: ERRor

: [NEXT]?

: SYSTem: ERRor: [NEXT]?

This command read message in Error Queue

Returned message please refer to section 5.7 Error Message.

: MEMory

: DELete

LOCAtion *< register number >*

: MEMory: DELete: LOCAtion

This command deletes the parameter data in main memory.

: STATe

: DEFine *< name >, < register number >*

The command sets the name of the location of in main memory.

: DEFine? *< name >*

The command queries the location of the name.

: NSTates?

This command requests the analyzer return the number of *SAV / *RCL available in the analyzer. The return value is one greater than the maximum.

: FREE

: STEP?

: MEMory: FREE: STEP?

This command queries the rest STEP number in main memory.

: STATe?

: MEMory: FREE: STATe?

This command queries the rest PRESET parameter number in main memory.

[: SOURce]

: SAFEty

: STARt

[: ONCE]

: SOURce: SAFEty: STARt

This command starts test.

: OFFSet GET|OFF

: SOURce: SAFEty: STARt: OFFSet GET

This command gets zeroing value

: SOURce: SAFEty: STARt: OFFSet OFF

This command is off zeroing function.

: OFFSet?

: SOURce: SAFEty: STARt: OFFSet?

This command queries if do zeroing action or not.

Return <boolean>

: STOP

: SOURce: SAFEty: STOP

This command is stop test.

: STATus?

: SOURce: SAFEty: STATus?

This command queries the execution status of the current device.

Return character data RUNNING | STOPPED

: FETCh? [< item >] { , < item > }

The command queries the metered data. The < item > is character data.

The command responding the following data:

ITEM	Responding Data
STEP	The step number.
MODE	The test mode.
OMETerage	The value of output meter.
MMETerage	The value of measure meter.
RMETerage	The value of real meter.
RELApsed	The elapse time of ramp.
RLEFt	The left time of ramp.
TELApsed	The elapse time of test.
TLEFt	The left time of test.
FELApsed	The elapse time of fall.
FLEFt	The left time of fall.
CHANnel	The scan box status.

: RESult

: ALL

[: JUDGment]?

: SOURce: SAFEty: RESult: ALL: JUDGment?

This command queries all judgment result.

Return format:

: OMETerage?

: SOURce: SAFEty: RESult: ALL: OMETerage?

This command queries all OUTPUT METER reading of STEP.

: MMETerage?

: SOURce: SAFEty: RESult: ALL: MMETerage?

This command queries all MEASURE METER reading of STEP.

: RMETerage?

: SOURce: SAFEty: RESult: ALL: RMETerage?

This command queries all REAL CURRENT METER reading of STEP.

: TIME

[: TEST]?

: SOURce: SAFEty: RESult: ALL: TIME: TEST?

This command queries test needed time of all STEP.

: RAMP?

: SOURce: SAFEty: RESult: ALL: TIME: RAMP?

This command queries all STEP test ramps o setting voltage

: COMPleted?

: SOURce: SAFEty: RESult: COMPlete?

This command queries if the device complete the execution action of all setting value.

Return 1 or 0

: AREPort <boolean>|ON|OFF (RS232 Interface only)

: SOURce: SAFEty: RESult: AREPort

This command sets if automatic reports test result.

: AREPort? (RS232 Interface only)

: SOURce: SAFEty: RESult: AREPort

This command queries if automatic reports test result.

Return 1 or 0

[: LAST]?

[: JUDGment]?

: SOURce: SAFEty: RESult: LAST: JUDGment?

This command queries the last judgment result code of STEP.

: OMETerage?

: SOURce: SAFEty: RESult: LAST: OMETerage?

This command queries OUTPUT METER reading of the last STEP.

: MMETerage?

: SOURce: SAFEty: RESult: LAST: MMETerage?

This command queries MEASURE METER reading of the last STEP.

: RMETerage?

: SOURce: SAFEty: RESult: LAST: RMETerage?

This command queries REAL CURRENT METER reading of the last STEP.

: STEP<n>

: JUDGment?

: SOURce: SAFEty: RESult: STEP: JUDGment?

This command queries the judgment result code of selected STEP.

: OMETerage?

: SOURce: SAFEty: RESult: STEP: OMETerage?

This command queries OUTPUT METER reading of selected STEP.

: MMETerage?

: SOURce: SAFEty: RESult: STEP: MMETerage?

This command queries MEASURE METER reading of selected STEP.

: RMETerage?

: SOURce: SAFEty: RESult: STEP: RMETerage?

This command queries REAL CURRENT METER reading of selected STEP.

Common judgment result code list

Judgment Result	Code (HEX)	Code (metric system)
PASS	0x74	116
USER STOP	0x71	113
CAN NOT TEST	0x72	114
TESTING	0x73	115
STOP	0x70	112

Judgment result no good code list

	AC MODE		DC MODE		IR MODE	
	Hex	Dec	Hex	Dec	Hex	Dec
HI	11	17	21	33	31	49
LO	12	18	22	34	32	50
ARC	13	19	23	35	33	----
IO	14	20	24	36	34	52
CHECK LOW	----	----	25	37	----	----
ADV OVER	16	22	26	38	36	54
ADI OVER	17	23	27	39	37	55
REAL HIGH	1a	26	----	----	----	----
GR CONT.	78	120	78	120	78	120
TRIPPED	79	121	79	121	79	121
IO-F	16	27	26	43	----	----

: SNUMber?

: SOURce: SAFEty: SNUMber?

This command queries how many STEP being set in memory.

: STEP<n>

: DELete

: SOURce: SAFEty: STEP: DELete

This command clears all setting value in selected Step to initial value.

<n>The metric system value is 1 ~99 (included)

: SET?

: SOURce: SAFEty: STEP: SET?

This command queries all setting value in selected STEP.

: MODE?

: SOURce: SAFEty: STEP: MODE?

This command queries MODE in selected STEP.

Return character data AC | DC | IR

: AC

[: LEVel] <numeric_value>

: SOURce: SAFEty: STEP: AC: LEVel

This command sets selected Step which AC withstand voltage test needed voltage value.

<numeric_value> is 50 ~5000 (included), the unit is volt.

[: LEVel]?

: SOURce: SAFEty: STEP: AC: LEVel?

This command queries selected STEP which AC withstand voltage test needed voltage value.

Return value is 50 ~ 5000 (included), the unit is volt.

: LIMit

[: HIGH] <numeric_value>

: SOURce: SAFEty: STEP: AC: LIMit: HIGH

This command sets selected STEP which AC withstand voltage leakage current high limit.

[: HIGH]?

: SOURce: SAFEty: STEP: AC: LIMit: HIGH?

This command queries selected STEP which AC withstand voltage leakage current high limit.

: LOW <numeric_value>

: SOURce: SAFEty: STEP: AC: LIMit: LOW

This command sets selected STEP which AC withstand voltage leakage current low limit.

: LOW?

: SOURce: SAFEty: STEP: AC: LIMit: LOW?

This command queries selected STEP which AC withstand voltage leakage current low limit.

: ARC

[: LEVel] <numeric_value>

: SOURce: SAFEty: STEP: AC: LIMit: ARC: LEVel

This command sets selected STEP which ARC checking value.

[: LEVel]?

: SOURce: SAFEty: STEP: AC: LIMit: ARC: LEVel?

This command queries selected STEP which ARC checking value.

: REAL

[: HIGH]

: SOURce: SAFEty: STEP: AC: LIMit: REAL: HIGH
This command sets selected STEP which AC withstand voltage real current high limit.

[: HIGH]?
: SOURce: SAFEty: STEP: AC: LIMit: REAL: HIGH?
This command queries selected STEP which AC withstand voltage real current high limit.

: TIME

: RAMP <numeric_value>
: SOURce: SAFEty: STEP: AC: TIME: RAMP
This command sets selected STEP which test ramps to setting voltage needed time.

: RAMP?
: SOURce: SAFEty: STEP: AC: TIME: RAMP?
This command queries selected STEP which test ramps to setting voltage needed time.

[: TEST] <numeric_value>
: SOURce: SAFEty: STEP: AC: TIME: TEST
This command sets selected STEP which test needed time.

[: TEST]?
: SOURce: SAFEty: STEP: AC: TIME: TEST?
This command queries selected STEP which test needed time.

[: FALL] <numeric_value>
: SOURce: SAFEty: STEP: AC: TIME: FALL
This command sets selected STEP which voltage value of setting fall to zero needed time.

[: FALL]?
: SOURce: SAFEty: STEP: AC: TIME: FALL?
This command queries selected STEP which voltage value of setting fall to zero needed time.

: CHANnel

[: HIGH] <channel_list>
: SOURce: SAFEty: STEP: AC: CHANnel: HIGH
This command sets selected step the voltage output channels.

[: HIGH]?

: SOURce: SAFEty: STEP: AC: CHANnel: HIGH?

This command queries selected step the voltage output channels.

: LOW <channel_list>

: SOURce: SAFEty: STEP: AC: CHANnel: LOW

This command sets selected step the return channels.

: LOW?

: SOURce: SAFEty: STEP: AC: CHANnel: LOW?

This command queries selected step the return channels.

: DC

[: LEVel] <numeric_value>

: SOURce: SAFEty: STEP: DC: LEVel

This command sets selected STEP which DC withstand voltage test needed voltage value.

<numeric_value> is 50-6000 (included), the unit is volt.

[: LEVel]?

: SOURce: SAFEty: STEP: DC: LEVel?

This command queries selected STEP which DC withstand voltage test needed voltage value.

Return value is 50-6000 (included), the unit is volt.

: LIMit

[: HIGH] <numeric_value>

: SOURce: SAFEty: STEP: DC: LIMit: HIGH

This command sets selected STEP which AC withstand voltage leakage current high limit.

[: HIGH]?

: SOURce: SAFEty: STEP: DC: LIMit: HIGH?

This command queries selected STEP which AC withstand voltage leakage current high limit.

: LOW <numeric_value>

: SOURce: SAFEty: STEP: DC: LIMit: LOW

This command sets selected STEP which AC withstand voltage leakage current low limit.

: LOW?

: SOURce: SAFEty: STEP: DC: LIMit: LOW?
This command queries selected STEP which AC withstand voltage leakage current low limit.

: ARC

[: LEVel] <numeric_value>
: SOURce: SAFEty: STEP: DC: LIMit: ARC: LEVel
This command sets selected STEP which ARC checking value.

[: LEVel]?
: SOURce: SAFEty: STEP: DC: LIMit: ARC: LEVel?
This command queries selected STEP which ARC checking value.

: CLOW <boolern>|ON|OFF
: SOURce: SAFEty: STEP: DC: CLOW
This command sets selected STEP detect if charge current over low or not.

: CLOW?
: SOURce: SAFEty: STEP: DC: CLOW?
This command queries selected STEP detect if charge current over low or not.

: TIME

: RAMP <numeric_value>
: SOURce: SAFEty: STEP: DC: TIME: RAMP
This command sets selected STEP which test ramps to set voltage needed time.

: RAMP?
: SOURce: SAFEty: STEP: DC: TIME: RAMP
This command queries selected STEP which test ramps to set voltage needed time.

[: TEST] <numeric_value>
: SOURce: SAFEty: STEP: DC: TIME: TEST
This command sets selected STEP which test needed time.

[: TEST]?
: SOURce: SAFEty: STEP: DC: TIME: TEST

This command queries selected STEP which test needed time.

[: FALL] <numeric_value>

: SOURce: SAFEty: STEP: AC: TIME: FALL

This command sets selected STEP which voltage value of setting fall to zero needed time.

[: FALL]?

This command queries selected STEP which voltage value of setting fall to zero needed time.

: CHANnel

[: HIGH] <channel_list>

: SOURce: SAFEty: STEP: DC: CHANnel: HIGH

This command sets selected step the voltage output channels.

[: HIGH]?

: SOURce: SAFEty: STEP: DC: CHANnel: HIGH

This command queries selected step the voltage output channels.

: LOW <channel_list>

: SOURce: SAFEty: STEP: DC: CHANnel: LOW

This command sets selected step the return channels.

: LOW?

: SOURce: SAFEty: STEP: DC: CHANnel: LOW

This command queries selected step the return channels.

: IR

[: LEVel] <numeric_value>

: SOURce: SAFEty: STEP: IR: LEVel

This command sets selected STEP which IR test needed voltage value.

<numeric_value> is 50-1000 (included), the unit is volt.

[: LEVel]?

: SOURce: SAFEty: STEP: IR: LEVel

This command sets selected STEP which IR test needed voltage value

Return value is 50-1000 (included), the unit is volt.

: LIMit

: HIGH <numeric_value>

: SOURce: SAFEty: STEP: IR: LIMit: HIGH

This command sets selected STEP which IR high limit.

: HIGH?

: SOURce: SAFEty: STEP: IR: LIMit: HIGH?

This command queries selected STEP which IR high limit.

[: LOW] <numeric_value>

: SOURce: SAFEty: STEP: IR: LIMit: LOW

This command sets selected STEP which IR low limit.

[: LOW]?

: SOURce: SAFEty: STEP: IR: LIMit: LOW?

This command queries selected STEP which IR low limit.

: TIME

: RAMP <numeric_value>

: SOURce: SAFEty: STEP: IR: TIME: RAMP

This command sets selected STEP which test ramps to setting voltage needed time.

: RAMP?

: SOURce: SAFEty: STEP: IR: TIME: RAMP?

This command queries selected STEP which test ramps to setting voltage needed time.

[: TEST] <numeric_value>

: SOURce: SAFEty: STEP: IR: TIME: TEST

This command sets selected STEP which test needed time.

[: TEST]?

: SOURce: SAFEty: STEP: IR: TIME: TEST?

This command sets selected STEP which test needed time.

[: FALL] <numeric_value>

: SOURce: SAFEty: STEP: AC: TIME: FALL

This command sets selected STEP which voltage value of setting fall to zero needed time.

[: FALL]?

: SOURce: SAFEty: STEP: AC: TIME: FALL?

This command queries selected STEP which voltage value of setting fall to zero needed time.

: CHANnel

[: HIGH] <channel_list>

: SOURce: SAFEty: STEP: IR: CHANnel: HIGH

This command sets selected step the voltage output channels.

[: HIGH]?

: SOURce: SAFEty: STEP: IR: CHANnel: HIGH?

This command queries selected step the voltage output channels.

: LOW <channel_list>

: SOURce: SAFEty: STEP: IR: CHANnel: LOW

This command sets selected step the return channels.

: LOW?

: SOURce: SAFEty: STEP: IR: CHANnel: LOW?

This command queries selected step the return channels.

: PRESet

: TIME

: PASS <numeric_value>

: SOURce: SAFEty: PRESet: TIME: PASS

This command sets the buzzer sound output continuous time when pass.

<numeric_value> is 0.2-99.9(included).

: PASS?

: SOURce: SAFEty: PRESet: TIME: PASS?

This command queries buzzer sound output continuous time when pass.

Return value is 0.2-99.9(included).

: STEP <numeric_value>|KEY

: SOURce: SAFEty: PRESet: TIME: STEP

This command sets the interval time between STEP and STEP, or the next start command to execute the next STEP.

<numeric_value> is a value or character KEY between 0.1 and 99.9 (included).

: STEP?

: SOURce: SAFEty: PRESet: TIME: STEP?

This command queries the interval time between STEP and STEP, or the next start command to execute the next STEP.

Return value is 0.1-99.9 (included).

: JUDGment <numeric_value>

: SOURce: SAFEty: PRESet: TIME: JUDGment

This command sets a period of time, it is not judgment during this time.

<numeric_value> is 0.1-99.9(included).

: JUDGment?

: SOURce: SAFEty: PRESet: TIME: JUDGment?

This command queries a period of time, it is not judgment during this time.

Return a value or KEY between 0.1 and 99.9(included).

: AC

: FREQuency <numeric_value>

: SOURce: SAFEty: PRESet: AC: FREQuency

This command sets the output voltage frequency when AC withstand voltage test.

<numeric_value> is 50-60 (included).

: FREQuency?

: SOURce: SAFEty: PRESet: AC: FREQuency?

This command queries the output voltage frequency when AC withstand voltage test.

Return value is 50-60 (included).

: WRANge

[: AUTO] <boolean>|ON|OFF

: SOURce: SAFEty: PRESet: WRANge: AUTO

This command sets withstand voltage auto range function is ON or OFF.

[: AUTO]?

: SOURce: SAFEty: PRESet: WRANge: AUTO?

This command queries withstand auto range function is ON or OFF.

Return 1 or 0

: AGC

[: SOFTware] <boolean>|ON|OFF

: SOURce: SAFEty: PRESet: AGC: SOFTware

This command sets software AGC is ON or OFF.

[: SOFTware]?

: SOURce: SAFEty: PRESet: AGC: SOFTware?

This command queries software AGC is ON or OFF.

Return 1 or 0

: GCONtinuity <boolean>|ON|OFF

: SOURce: SAFEty: PRESet: GCONtinuity

This command sets grounding impedance test is ON or OFF.

: GCONtinuity?

: SOURce: SAFEty: PRESet: GCONtinuity?

This command queries grounding impedance test is ON or OFF.

Return 1 or 0

: GFI

[: SWITCH] <Boolean>|ON|OFF

: SOURce: SAFEty: PRESet: GFI: SWITCH

This command sets GFI switch is ON or OFF.

[: SWITCH]?

: SOURce: SAFEty: PRESet: GFI: SWITCH?

This command queries GFI switch is ON or OFF.

Return 1 or 0.

: FCONtinuity <Boolean>|ON|OFF

: SOURce: SAFEty: PRESet: FCONtinuity

This command sets FAIL happened, if continuity for testing next procedure.

: FCONtinuity?

This command queries FCONtinuity is ON or OFF.

Return 1 or 0.

: NUMber

: PART

: SOURce: SAFEty: PRESet: NUMber: PART

This command sets part number.

: PART?

SOURce: SAFEty: PRESet: NUMber: PART?

This command queries part number.

LOT

: SOURce: SAFEty: PRESet: NUMber: LOT

This command sets lot number.

LOT?

: SOURce: SAFEty: PRESet: NUMber: LOT?

This command queries lot number.

SERIal

: SOURce: SAFEty: PRESet: NUMber: SERIal

This command sets serial number format, denotes changeable character by *.

SERIal?

: SOURce: SAFEty: PRESet: NUMber: SERIal?

This command queries serial number format.

5.8 Error Messages

- Error messages are saved in error queue which access by FIFO method. The return first error message is the first being saved.
- When the error message is over 30, the last position will save -350," Queue overflow". The error queue can't save error message any more till there is error message out.
- When there is no error, the first position will save +0,"No error" in error queue.

-102 Syntax error

Syntax error, usually includes not allowed character symbol in command.

-108 Parameter not allowed

The device receives parameter is not allowed.

-109 Missing parameter

Parameter is missed.

-112 Program mnemonic too long

Simple command program header is over 12 characters.

-113 Undefined header

The device is received undefined header.

-114 Header suffix out of range

Variable is out of range.

-151 Invalid string data

Invalid string data is usually missing double quotation.

-158 String data not allowed

The device is received disallowed string data.

-170 Expression error

The device is received uncompleted parameter data, such as missing the right parenthesis.

-222 Data out of range

The data is out of range.

-290 Memory use error

Store or read the memory is error.

-291 Out of memory

The value is out of memory.

-292 Referenced name does not exist

-293 Referenced name already exist

-361 Parity error in program message

The parity is error.

-365 Time out error

The device isn't received end character within a certain time.

-363 Input buffer overrun

The device is received over 1024 characters.

-400 Queue error

The output queue data is over 256 characters.

-410 Query INTERRUPTED

When received a query command, you don't read out the query result and then received a query command immediately. The query will be interrupted.

-420 Query UNTERMINATED

There is no data in queue, meanwhile received the command of reading output queue data.

5.9 GPIB Operation Using Basic

```
REM-------------------------------------------------------------------------
REM      Please run the ULI file before this program.
REM      This program is that input data through GPIB to WT-8750.
REM       WT-8750's   GPIB address is 3
REM-------------------------------------------------------------------------

CLS
PRINT "Program is running"
OPEN "gpib0" FOR OUTPUT AS #1
OPEN "gpib0" FOR INPUT AS #2
PRINT #1, "abort"
PRINT #1, "GPIBEOS IN LF"

PRINT #1, "output 3; SOURce: SAFEty: STOP"
PRINT #1, "output 3; SOURce: SAFEty: SNUMBer?"
PRINT #1, "enter 3"
INPUT #2, STEPNUM%

PRINT "DEL STEPS"

IF STEPNUM% > 0 THEN
   FOR I = STEPNUM% TO 1 STEP -1
       PRINT #1, "output 3; SOURce: SAFEty: STEP", I, ": DELete"
   NEXT I
END IF

PRINT "set steps"

PRINT #1, "output 3; SOURce: SAFEty: STEP 1: DC 1000"
PRINT #1, "output 3; SOURce: SAFEty: STEP 1: DC: LIMit 0.0004"
PRINT #1, "output 3; SOURce: SAFEty: STEP 1: DC: TIME 2"

PRINT #1, "output 3; SOURce: SAFEty: STEP 2: AC 1000"
PRINT #1, "output 3; SOURce: SAFEty: STEP 2: AC: LIMit 0.0002"
PRINT #1, "output 3; SOURce: SAFEty: STEP 2: AC: TIME: TEST 3"
```

```
PRINT #1, "output 3; SOURce: SAFEty: STOP"
PRINT #1, "output 3; SOURce: SAFEty: STARt"

WHILE status$ <> "STOPPED"
    PRINT #1, "output 3; SAFEty: STATus?"
    PRINT #1, "enter 3"
    INPUT #2, status$
    PRINT status$

    IF status$ = "STOPPED" THEN
        PRINT #1, "output 3; SOURce: SAFEty: STOP"
        PRINT #1, "output 3; SAFEty: RESult: ALL: OMET?"
        PRINT #1, "enter 3"

        FOR j = 1 TO STEPNUM%
            INPUT #2, result$
            PRINT "step", j, ": ", result$
        NEXT j

        PRINT

        PRINT #1, "output 3; SAFEty: RESult: ALL: MMET?"
        PRINT #1, "enter 3"

        FOR j = 1 TO STEPNUM%
            INPUT #2, result$
            PRINT "step", j, ": ", result$
        NEXT j
    END IF
WEND

PRINT #1, "output 3; SOURce: SAFEty: STOP"
CLOSE: SYSTEM
END
```

```
REM-------------------------------------------------------------------------------
REM       Please run the ULI file before this program.
REM       This program is that getting results
REM            through GPIB from the WT-8750.
REM        WT-8750's   GPIB address is 3
REM-------------------------------------------------------------------------------
REM CLS
PRINT "Program is running."
OPEN "gpib0" FOR OUTPUT AS #1              'set the talker
OPEN "gpib0" FOR INPUT AS #2               'set the listener

REM   define the SRQ-handling routine
ON PEN GOSUB MySRQRoutine
REM Enable the on SRQ functionality
PEN ON

PRINT #1, "abort"

PRINT #1, "GPIBEOS IN LF"                  ' set the end code
REM PRINT "waiting for SRQ from WT-8750"
PRINT #1, "output 3; SOURce: SAFEty: STOP"      ' STOP the instrument

PRINT #1, "output 3; *SRE 2"               'set status enable register
PRINT #1, "output 3; *ESE 60"              'set standard enable register

PRINT #1, "output 3; SOURce: SAFEty: STARt"

FOR I = 1 TO 10000
   PRINT "Please wait for SRQ ", I
NEXT I

PRINT "Program is stopped!"

GOTO END1

MySRQRoutine:                              ' SRQ interrupt
   PEN OFF
   PRINT "Running the SRQ"
```

```
   PRINT #1, "output 3;*STB?"
   PRINT #1, "enter 3"
   INPUT #2, Q$                              'get the questionable state
   PRINT Q$

   RES = CVI (Q$)

                              IF RES AND 2 = 2 THEN
       PRINT "HAS RESULT!"
   END IF                                    'End of SRQ interrupt

END1:
       PRINT #1, "output 3; SOURce: SAFEty: RESult: LAST: JUDGment?"
       PRINT #1, "enter 3"
       INPUT #2, S$                          ' get the questionable state
       PRINT S$

    PRINT #1, "output 3;*STB?"
    PRINT #1, "enter 3"
    INPUT #2, Q$                             ' get the questionable state
   PRINT Q$

CLOSE :   SYSTEM
```

```
REM ----------------------------------------------------------
        'Please run the ULI file before this program
        'WT-8750 GPIB address is 3
REM ----------------------------------------------------------

OPEN "gpib0" FOR OUTPUT AS #1
                        OPEN "gpib0" FOR INPUT AS #2

PRINT #1, "abort"
PRINT #1, "GPIBEOS IN LF"
PRINT #1, "output 3; SOURce: SAFEty: STOP"
PRINT #1, "output 3; SOURce: SAFEty: STEP1: AC: LEVel 600"
     PRINT #1, "output 3; SOURce: SAFEty: STEP1: AC: LIMit: HIGH 0.0004"

PRINT #1, "output 3; SOURce: SAFEty: STEP2: AC: LEVel 500"
     PRINT #1, "output 3; SOURce: SAFEty: STEP2: AC: LIMit: HIGH 0.0003"

'Work memory were stored in memory AAA.
PRINT #1, "output 3; *SAV 1"
PRINT #1, "output 3; MEMory: STATe: DEFine AAA,1"
'Work memory were stored in memory 1.

PRINT #1, "output 3; SOURce: SAFEty: STEP3: DC: LEVel 700"
      PRINT #1, "output 3; SOURce: SAFEty: STEP3: DC: LIMit: HIGH 0.01"

PRINT #1, "output 3; SOURce: SAFEty: STEP4: IR: LEVel 800"
     PRINT #1, "output 3; SOURce: SAFEty: STEP4: IR: LIMit: HIGH 5000000"

PRINT #1, "output 3; *SAV 3"
PRINT #1, "output 3; MEMory: STATe: DEFine BBB, 3"
'Work memory were stored in memory 3.


'PRINT #1, "output 3; MEMory: STORe: NAME BBB"
'Work memory were stored in memory BBB.


PRINT #1, "output 3; *RCL 1"   'Recall the memory 1
'PRINT #1, "output 3; MEMory: RECAll: NAME AAA"   'Recall the memory AAA


CLOSE:   SYSTEM
```

6. RS232 Interface

6.1 Guide

The user can use computer by RS232 interface to remote control and data transfer.

6.2 Interface Specification

It's a standard RS232 interface, the setting value as the following:
BAUD RATE : 300 / 600 / 1200 / 2400 / 4800 / 9600 / 19200
PARITY : NONE / ODD / EVEN
FLOW CTRL. : NONE / SOFTWARE

6.3 Command Format

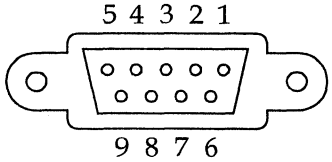
The analyzer RS232 interface function composed command string is inputted by ASCII code to attain functions of remote control and setting. The length of the command string is limited in 1024 characters (include end code) [Command + Parameter] compose a command. Two commands can be connected by semicolon and end by ending code. The end code are the following types, the analyzer can distinguish it by self.

End code

LF
CR + LF

6.4 Connector

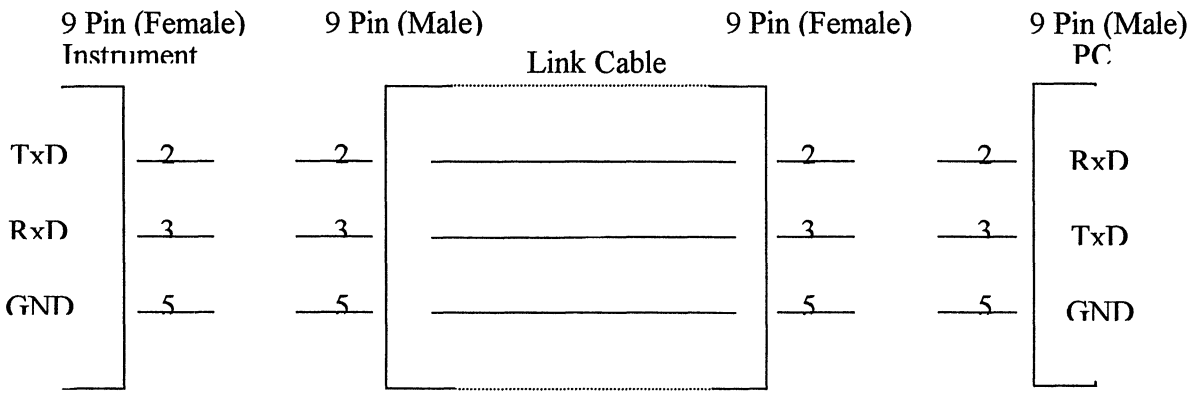
The analyzer RS232 connecter is a 9 pin D-Sub connector.



Pin Number		Description
1	*	Don't use
2	TxD	Send data
3	RxD	Receive data
4	*	Don't use
5	GND	Ground
6	*	Don't use
7	*	Don't use
8	*	Don't use
9	*	Don't use

6.5 Method of Connecting

The connection as the following:



6.6 RS232 Operation Using Basic

```
REM-----------------------------------------------------------
REM      RS232 example program
REM      Program compiled using Microsoft version 1.1 (MS-DOS 6.22)
REM-----------------------------------------------------------

REM open serial port as device 1
OPEN "COM2: 9600,N, 8,1,RS, CS, DS, CD, LF" FOR RANDOM AS #1

PRINT #1, "SOURce: SAFEty: STOP"   'send "STOP" command to device

PRINT #1, "SOURce: SAFEty: SNUMBer?"
INPUT #1, STEPNUM%

IF STEPNUM% > 0 THEN
   FOR I = STEPNUM% TO 1 STEP -1
      PRINT #1, "SOURce: SAFEty: STEP", I, ": DELete"   'clear all steps data
   NEXT I
END IF

PRINT #1, "SOURce: SAFEty: STEP1: AC: LEVel 500"
PRINT #1, "SOURce: SAFEty: STEP1: AC: LIMit: HIGH 0.0003"
PRINT #1, "SOURce: SAFEty: STEP1: AC: TIME: TEST 3"

PRINT #1, "SOURce: SAFEty: STEP2: DC: LEVel 500"
PRINT #1, "SOURce: SAFEty: STEP2: DC: LIMIT 0.0003"
PRINT #1, "SOURce: SAFEty: STEP2: DC: TIME 3"

PRINT #1, "SOURce: SAFEty: STEP3: IR: LEVel 500"
PRINT #1, "SOURce: SAFEty: STEP3: IR: LIMIT 300000"
PRINT #1, "SOURce: SAFEty: STEP3: IR: TIME 3"

PRINT #1, "SOURce: SAFEty: SNUMBer?"
INPUT #1, STEPNUM%

PRINT #1, "SOURce: SAFEty: STARt"                    'start test

WHILE status$ <> "STOPPED"
      PRINT #1, "SOURce: SAFEty: STATUS?"
      INPUT #1, status$                              'read status

      IF status$ = "STOPPED" THEN                    'if status not=TEST
         PRINT #1, "SOURce: SAFEty: STOP"            'send STOP command

         PRINT #1, "SAFEty: RESult: ALL: OMET?"

         FOR j = 1 TO STEPNUM%
            INPUT #1, result$
```

```
            PRINT "step", j, ": ", result$

        NEXT j
PRINT

            PRINT #1, "SAFEty: RESult: ALL: MMET?"
            FOR j = 1 TO STEPNUM%
                INPUT #1, result$
                PRINT "step", j, ": ", result$
            NEXT j
        END IF
WEND

PRINT #1, "SOURce: SAFEty: STOP"
CLOSE #1
END
```

7. Not yet determined

8. Printer Function

Preface

The user can connect printer (any brand printer except HP) to print test parameter setting value or test result report.

How to print test parameter setting value?

1. Under power-on screen, press Function Key F3 MENU then move cursor to 8. PRINT PROGRAM.
2. Press Function Key F3 SELECT , connect correct printer then will auto print test parameter setting value in memory.

How to print test result report?

After setting printer print parameter, follow normal test procedures to test. When test is completed according to the user setting, connect correct printer to print out test result report.

Enter printer print parameter setting screen.

1. Under power-on screen, press Function Key MENU then move cursor to 3. OPTION.
2. Press Function Key SELECT , then move cursor to 3. PRINT.
3. Press Function Key F3 SELECT , then start to set print parameter.

How to set printer print parameter?

1. By using Function Keys UP, DOWN to set every parameter data.
2. By using Function Key ENTER to move cursor.
3. By using Function Key EXIT to exit this screen.

Print parameter description

A. AUTO PRINT -- includes the following two parameters for setting print test result report timing.

1. PASS : OFF -- When setting is ON, test result is PASS will print test result report.
2. FAIL : OFF- - When setting is ON, test result is FAIL will print test result report.

B. PRINT DATA - - Includes the following five parameters for setting print test result report included data.

1. PART NO. : OFF- - When setting is ON, test result report will print PART NUMBER.

2. LOT NO. : OFF- - When setting is ON, test result report will print LOT NUMBER.
3. SERIAL NO. : OFF- - When setting is ON, test result report will print SERIAL NUMBER.
4. TEST DATA : OFF- - When setting is ON, test result report will print test voltage, current / resistance value.
5. RESULT : OFF- - when setting is ON, test result report will print test result is PASS or FAIL.

9. Calibration Procedure

Before process this section the PUNCTURE INSULATION METER be warm up at least 30 minutes. Take off the calibration front panel. Press the lock switch, this is a hardware data backup protection circuit, to avoid calibration data loss.
Calibration using the measuring instrument and resistor in the following table.

Measuring instrument	Representation specification	Model
Digital high- voltage meter	Measurement range DC:±(0.500～10.000kV) AC:0.500～10.000kV Accuracy DC:±(0.3% rdg + 5digits) AC:±(0.5% rdg + 5digits) Input resistance 1GΩ	
Digital multi-meter	Measurement range Voltage DC:±(50～1000V) AC:50～1000V 50/60Hz Current DC:±(0.01～10mA) AC:0.1～30mA 50/60Hz Accuracy <0.5%	HP3458A Agilent Technologies
Standard resistance box	Range 0～50000MΩ Accuracy ±2% Max voltage DC:1000V	SR-2 HIOKI
Dummy load	10MΩ 0.5W 1% 420kΩ 50W 1% 150kΩ 100W 1% 50kΩ 200W 1%	JAPAN HYDRAZINE
ARC Detection Instrument	250kΩ Inclusion	

The following items are need to calibration.

Voltage Calibration (See 9.2)

ACV 5kV Offset (100V)	; AC Voltage OFFSET point
ACV 5kV Full (4kV)	; AC Voltage FULL point
DCV 6kV Offset (100V)	; DC Voltage OFFSET point
DCV 6kV Full (4kV)	; DC Voltage FULL point
IRV 1kV Offset (100V)	; IR Voltage OFFSET point
IRV 1kV Full (1kV)	; IR Voltage FULL point

Current Calibration (See 9.3)

ACA 3mA Offset (0.12mA)	; AC total current 2.99mA range OFFSET point
ACA 3mA Full (2.5mA)	; AC total current 2.99mA range FULL point
ACA30mA Offset (2.5mA)	; AC total current 30mA range OFFSET point
ACA 30mA Full (25mA)	; AC total current 30mA range FULL point
RACA 3mA Offset (0.12mA)	; AC real current 2.99mA range OFFSET point
RACA 3mA Full (2.5mA)	; AC real current 2.99mA range FULL point
RACA 30mA Offset (2.5mA)	; AC real current 30mA range OFFSET point
RACA 30mA Full (25mA)	; AC real current 30mA range FULL point
DCA 3mA Offset (0.12mA)	; DC 2.99mA range OFFSET point
DCA 3mA Full (2.5mA)	; DC 2.99mA range FULL point
DCA 10mA Offset (2.5mA)	; DC 10mA range OFFSET point
DCA 10mA Full (8mA)	; DC 10mA range FULL point

Withstanding Voltage Mode ARCing Calibration (See 9.4)

AC ARC 15mA (5mA)	; AC ARCing calibration
DC ARC 10mA (5mA)	; DC ARCing calibration

Insulation Resistance Mode Leakage Current Meter Calibration (See 9.5)

IRR Range1 (1GΩ)	; IR Resistor range 1 Calibration
IRR Range2 (100MΩ)	; IR Resistor range 2 Calibration
IRR Range3 (10MΩ)	; IR Resistor range 3 Calibration
IRR Range4 (10MΩ)	; IR Resistor range 4 Calibration

Ground Continue Calibration (See 9.6)

Contrast Calibration (See 9.7)

9.1 Calibration

press	[MENU] [DOWN] [DOWN] [DOWN]
display	CALIBRATION
press	[ENTER]
display	password
press	[A] [A] [A] [B] [ENTER]

9.2 Voltage Calibration

9.2.1 ACV Calibration

Connect an ACV HI voltage meter to PUNCTURE INSULATION METER.

press	[UP] or [DOWN] key times to display	
display	ACV 5kv Offset (100V)	; ACV Voltage Offset calibration
press	[STOP] [START]	; read out HV meter value
		; example 0. 105kV
press	[UP] or [DOWN] key until display 0. 105 kV	
press	[ENTER] for saving calibration value.	
press	[STOP]	; stop ACV voltage offset calibration
press	[UP] key	
display	ACV 5kV Full (4kV)	; ACV Voltage full scale calibration
press	[STOP] [START]	; read out the HV meter value
		; example 4.152kV
press	[UP] or [DOWN] key until display 4.152 kV	
press	[ENTER] for saving calibration value.	
press	[STOP]	; stop ACV voltage full scale calibration

9.2.2 DCV Calibration

Connect a DCV HI voltage meter to PUNCTURE INSULATION METER.

press	[UP] key	
display	DCV 6kV Offset (100V)	; DCV voltage Offset calibration
press	[STOP] [START]	; read out HV meter value
		; example 0.105kV
press	[UP] or [DOWN] key until display 0. 105 kV	

press	[ENTER] for saving calibration value.	
press	[STOP]	; stop DCV voltage offset calibration
press	[UP] key	
display	DCV 6kV Full (4kV)	; DCV Voltage full scale calibration
press	[STOP] [START]	; read out HV meter value
		; example 4.152kV
press	[UP] or [DOWN] key until display 4.152 kV	
press	[ENTER] for saving calibration value.	
press	[STOP]	; stop DCV voltage full scale calibration

9.2.3 IR Voltage Calibration

Connect a DCV HI voltage meter to PUNCTURE INSULATION METER.

press	[UP] key	
display	IRV 1kV Offset (100V)	; IR voltage Offset calibration
press	[STOP] [START]	; read out HV meter value
		; example 0. 105kV
press	[UP] or [DOWN] key until display 0. 105 kV	
press	[ENTER] for saving calibration value.	
press	[STOP]	; stop IR voltage Offset calibration
press	[UP] key to display	
display	IRV 1kV Full (1kV)	; IR voltage full scale calibration
press	[STOP] [START]	; read out HV meter value
		; example 1.052kV
press	[UP] or [DOWN] key until display 1.052 kV	
press	[ENTER] for saving calibration value.	
press	[STOP]	; stop IR voltage full scale calibration

9.3 Current Calibration

Caution! The dummy load must be between HI terminal and ammeter input terminal. Or, dangerous may be happened.

9.3.1 AC Current Calibration

Connect a dummy load resistor 10MΩ between PUNCTURE INSULATION METERs. Connect HI terminal to AC ammeter input HI terminal, connect LO terminal of PUNCTURE INSULATION METER to input LO terminal of AC ammeter.

press	[UP] key	
display	ACA 3mA offset (0.12mA)	; ACA 2.99mA range Offset calibration
press	[STOP] [START]	; read out the ammeter value ; example 0.124mA
press	[UP] or [DOWN] key until display 0. 124mA	
press	[ENTER] for saving calibration value.	
press	[STOP]	; stop ACA 2.999mA range Offset calibration

Change the dummy load resistor to 500kohm 50watt or higher.

press	[UP]	
display	ACA 3mA Full (2.5mA)	; ACA 2.999mA range full scale calibration
press	[STOP] [START]	; read out the ammeter value ; example 2.503mA]
press	[UP] or [DOWN] key until display 2.503mA	
press	[ENTER] for saving calibration value.	
press	[STOP]	; stop ACA 2.99mA range full scale calibration
press	[UP]	
display	ACA 30mA offset (2.5mA)	; ACA 30.00mA range Offset calibration
press	[STOP] [START]	; read out the ammeter value ; example 2.503mA
press	[UP] or [DOWN] key until display 2.503mA	
press	[ENTER] for saving calibration value.	
press	[STOP]	; stop ACA 30.00mA range Offset calibration

Change the dummy load resistor to 50kΩ 200watt or higher.

press	[UP]

display	ACA 30mA full (25mA)	; ACA 30.00mA range full scale calibration
press	[STOP] [START]	; read out the ammeter value ; example 24.50mA
press	[UP] or [DOWN] key until display 24.50mA	
press	[ENTER]	; stop ACA 30.00mA range full scale calibration

9.3.2 AC Real Current Calibration

Connect a dummy load resistor 10MΩ between PUNCTURE INSULATION METERs. Connect HI terminal of PUNCTURE INSULATION METER to input HI terminal of AC ammeter, connect LO terminal of PUNCTURE INSULATION METER to input LO terminal of AC ammeter.

press	[UP] key	
display	RACA 3mA offset (0.12mA)	; RACA 2.999mA range Offset calibration
press	[STOP] [START]	; read out the ammeter value ; example 0.124mA
press	[UP] or [DOWN] key until display 0. 124mA	
press	[ENTER] for saving calibration value.	
press	[STOP]	; stop RACA 2.999mA range Offset calibration

Change the dummy load resistor to 500kΩ 50watt or higher.

press	[UP] to display	
display	RACA 3mA Full (2.5mA)	; RACA 2.999mA range full scale calibration
press	[STOP] [START]	; read out the ammeter value ; example 2.503mA
press	[UP] or [DOWN] key until display 2.503mA	
press	[ENTER] for saving calibration value.	
press	[STOP]	; stop RACA 2.999mA range full scale calibration
press	[UP]	
display	RACA 30mA offset (2.5mA)	; RACA 30mA range Offset calibration
press	[STOP] [START]	; read out the ammeter value

; example 2.503mA

press [UP] or [DOWN] key until display 2.503mA

press [ENTER] for saving calibration value.

press [STOP] ; stop RACA 30.00mA range Offset calibration

Change the dummy load resistor to 50kΩ 200watt or higher.

press [UP]

display RACA 30mA full 2.50mA (25mA) ; RACA 30mA range full scale.

press [STOP] [START] ; read our the ammeter value

; example 24.50mA

press [UP] or [DOWN] key until display 24.50mA

press [STOP] ; stop RACA 30mA range full scale

; calibration

9.3.3 DC Current Calibration

Connect a dummy load resistor 10MΩ between PUNCTURE INSULATION METERs. Connect HI terminal of PUNCTURE INSULATION METER to input HI terminal of DC ammeter, connect LO terminal of PUNCTURE INSULATION METER to input LO terminal of DC ammeter.

press [UP] key

display DCA 3mA offset (0.12mA) ; DCA 2.999mA range Offset calibration

press [STOP] [START] ; read out the ammeter value

; example 0.124mA

press [UP] or [DOWN] key until display 0.124mA

press [ENTER] for saving calibration value.

press [STOP] ; stop DCA 2.999mA range Offset calibration

Change the dummy load resistor to 500kΩ 50watt or higher.

press [UP] key

display DCA 3mA Full (2.5mA) ; DCA 2.999mA range full scale calibration.

press [STOP] [START] ; read out the ammeter value

; example 2.503mA

press [UP] or [DOWN] key until display 2.503mA
press [ENTER] for saving calibration value.
press [STOP] ; stop DCA 2.999mA range full scale calibration.
press [UP] key
display DCA 10mA offset (2.5mA) ; DCA 10.00mA range Offset calibration.
press [STOP] [START] ; read out the ammeter value
; example 2.503mA
press [UP] or [DOWN] key until display 2.503mA
press [ENTER] for saving calibration value.
press [STOP] ; stop DCA 10.00mA range Offset calibration.

Change the dummy load resistor to150kΩ 100watt or higher.
press [UP] key to display
display DCA 10mA full (8mA) ; DCA 10.00mA range full scale calibration.
press [STOP] [START] ; read out the ammeter value
; example 8.02mA
press [UP] or [DOWN] key until display 8.02mA
press [ENTER] for saving calibration value.
press [STOP] ; stop DCA 10.00mA range full scale calibration.

9.4 Withstanding Voltage Mode ARCing Calibration

! Caution: 1. ARCing calibration is very special, the high voltage terminal are on outside.
2. Please contact your local agent for more detailed descriptions.

press [UP] key ; AC arcing sensitivity calibration.
display AC ARC 15mA (5mA) ; AC Puncture ARCing.
press [STOP] [START] ; Using two HV cables, HV output terminal series AEC detection Instrument include 250kΩ 5watt. Then press [STOP] [START] to generate ARCing.
press [UP] or [DOWN] key until ARC NG high limit value is a critical point of

generating ARC NG and non-generating ARC NG.

press	[STOP]	; stop AC ARCing calibration.
press	[UP] key	; DC ARCing sensitivity calibration
display	DC ARC 10mA (5mA)	; DC Puncture ARCing.
press	[STOP] [START]	; Using two HV cables, HV output terminal series ARC detection Instrument include 250kΩ 5watt. Then press [STOP] [START] to generateARCing.
press	[UP] or [DOWN] key until ARC FAIL high limit value is a critical point of generating ARC FAIL and non-generating ARC NG.	
press	[STOP]	; stop DC ARCing calibration.

9.5 Insulation Resistance Mode Resistor Calibration

Connecting a standard dummy load resistor between the high voltage output terminal and low potential terminal of the PUNCTURE INSULATION METER.

IRR Range1	(1GΩ)	; resistor of IR to 1GΩ
IRR Range2	(100MΩ)	; resistor of IR to 100.0Ω
IRR Range3	(10MΩ)	; resistor of IR to 10.0MΩ
IRR Range4	(10MΩ)	; resistor of IR to 10.0MΩ

Change the dummy load resistor to 1GΩ.

press	[UP] key	
display	IRR Range1 (1GΩ)	; resistor of IR to 1GΩ
press	[STOP] [START]	; read the IRR value
		; example 1GΩ
press	[UP] or [DOWN] key until display 1000MΩ	
press	[STOP]	; stop IRR Range1 calibration.

Change the dummy load resistor to 100MΩ.

press	[UP] key	
display	IRR Range2 (100MΩ)	; resistor of IR to 100MΩ
press	[STOP] [START]	; read the IRR value
		; example 100.0MΩ
press	[UP] or [DOWN] key until display 100.0MΩ	
press	[ENTER] for saving calibration value.	
press	[STOP]	; stop IRR Range2 calibration.

Change the dummy load resistor to 10MΩ.

press	[UP] key	
display	IRR Range3 (10MΩ)	; resistor of IR to 10MΩ
press	[STOP] [START]	; read the IRR value
		; example 10MΩ
press	[UP] or [DOWN] key until display 10.00MΩ	
press	[STOP]	; stop IRR Range3 calibration.

Change the dummy load resistor to 10MΩ.

press	[UP] key	
display	IRR Range4 (10MΩ)	; resistor of IR to 10MΩ
press	[STOP] [START]	; read the IRR value
press	[UP] or [DOWN] key until display 10.00MΩ	
press	[ENTER] for saving calibration value.	
press	[STOP]	; stop IRR Range4 calibration.

9.6 Ground Continue Calibration

1. Press [UP] key.
2. Connect resistance (0.8 ohm) to CONT. CHECK OPTION of rear panel and grounding terminal. Press [STOP] [START] to adjust 1 ohm in rear panel, calibrate VR to critical point of PASS and FAIL.
3. Press [STOP] twice.

9.7 Contrast Calibration

1. Press [UP] key.
2. Press [SETUP] key.
3. Press [UP] or [DOWN] until LCD contrast brightness is appropriate.

9.8 Finish Calibration

press	[EXIT] [DOWN] [DOWN] [DOWN] [ENTER]
display	PASSWORD:
press	[A] [A] [A] [A] [ENTER]
display	CALIBRATION IS OFF or CALIBRATION IS ON; choose CALIBRATION IS ON, if shows CALIBRATION IS OFF.
press	[A] [A] [A] [A] [ENTER]
display	CALIBRATION IS ON
press	[EXIT] to complete calibration steps.

9.9 Remote Calibration Command

9.9.1 Command List

```
CALibration
     :STATe <Boolean>
     :REQuest?
     :VALue <Numeric Value>
     :SAFEty
          :STARt
          :STOP
          :AC
               :VRANge? MAXimum|MINimum
               :VOLTage ( range)
                    :OFFSet
                         [:SOURce]
                              [:VOLTage]  [<Numeric Value>]
                              [:VOLTage]?
                         :BEST?
                    :FULL
                         [:SOURce]
                              [:VOLTage]  [<Numeric Value>]
                              [:VOLTage]?
                         :BEST?
               :CRANge? MAXimum|MINimum
               :CURRent ( range)
                    :OFFSet
                         [:SOURce]
                              [:VOLTage]  [<Numeric Value>]
                              [:VOLTage]?
                         :BEST?
                    :FULL
                         [:SOURce]
                              [:VOLTage]  [<Numeric Value>]
                              [:VOLTage]?
                         :BEST?
               :RCRANge? MAXimum|MINimum
               :RCURrent ( range)
                    :OFFSet
                         [:SOURce]
                              [:VOLTage]  [<Numeric Value>]
                              [:VOLTage]?
                         :BEST?
                    :FULL
                         [:SOURce]
                              [:VOLTage]  [<Numeric Value>]
                              [:VOLTage]?
                         :BEST?
               :ARANge? MAXimum|MINimum
               :ARC ( range)
                    :SLOPe
                         [:SOURce]
                              [:VOLTage]  [<Numeric Value>]
                              [:VOLTage] ?
                         :LEVel [<Numeric Value>]
                         :LEVel?
                         :BEST?
          :DC
               :VRANge? MAXimum|MINimum
               :VOLTage ( range)
                    :OFFSet
                         [:SOURce]
                              [:VOLTage]  [<Numeric Value>]
                              [:VOLTage]?
                         :BEST?
```

```
                :FULL
                     [:SOURce]
                          [:VOLTage]  [<Numeric Value>]
                          [:VOLTage]?
                     :BEST?
           :CRANge? MAXimum|MINimum
           :CURRent ( range)
                :OFFSet
                     [:SOURce]
                          [:VOLTage]  [<Numeric Value>]
                          [:VOLTage]?
                     :BEST?
                :FULL
                     [:SOURce]
                          [:VOLTage]  [<Numeric Value>]
                          [:VOLTage]?
                     :BEST?
           :ARANge? MAXimum|MINimum
           :ARC ( range)
                :SLOPe
                     [:SOURce]
                          [:VOLTage]  [<Numeric Value>]
                          [:VOLTage]?
                     :LEVel [<Numeric Value>]
                     :LEVel?
                     :BEST?
      :IR
           :VRANge? MAXimum|MINimum
           :VOLTage ( range)
                :OFFSet
                     [:SOURce]
                          [:VOLTage]  [<Numeric Value>]
                          [:VOLTage]?
                     :BEST?
                :FULL
                     [:SOURce]
                          [:VOLTage]  [<Numeric Value>]
                          [:VOLTage]?
                     :BEST?
           :RRANge? MAXimum|MINimum
           :RESistance ( range)
                :SLOPe
                     [:SOURce]
                          [:VOLTage]  [<Numeric Value>]
                          [:VOLTage]?
                     :BEST?
```

9.9.2 Commands Summary

■ **:CALibration:STATe <Boolean>**

The command is used to select if the calibration data applying (1) or (0).

At *RST, the state is set to ON.

■ **:CALibration:REQuest?**

The event attempts to attain the calibrating this device and returns 1 if succeed and 0 if it fails.

■ **:CALibration:VALue <Numeric_Value>**

Enters the value of calibration. If the state is not calibration or output on, an error -203 will be generated in addition to the execution error.

■ **:CALibration:SAFEty:STARt**

Start output the source, and can enter the value of calibration. When the state is not calibration, an error -203 will be generated as executing this command.

■ **:CALibration:SAFEty:STOP**

Stop output the source.

■ **:CALibration:SAFEty:AC:VRANge? {MAXimum, MINimum }**

Query the maximum and minimum of the range of the voltage source and meter of the AC mode.

■ **:CALibration:SAFEty:AC:VOLTage (range):OFFSet[:SOURce] [:VOLTage] [<Numeric Value>]**

Changing to the offset item of the voltage source and voltage meter of AC mode, and set the output voltage value that is used in the calibration.

■ **:CALibration:SAFEty:AC:VOLTage (range):OFFSet[:SOURce] [:VOLTage] ?**

Change to the offset item of the voltage source and voltage meter of AC mode, and returns the output voltage value which is used in the calibration.

■ **:CALibration:SAFEty:AC:VOLTage (range):OFFSet:BEST?**

Change to the offset item of voltage source and voltage meter of AC mode, and returns the best value that is selected by device.

■ **:CALibration:SAFEty:AC:VOLTage (range):FULL[:SOURce] [:VOLTage] [<Numeric Value>]**

Change to the offset item of voltage source and voltage meter of AC mode, and set the output voltage value that is used in the calibration.

■ **:CALibration:SAFEty:AC:VOLTage (range):FULL[:SOURce] [:VOLTage] ?**

Change to the offset item of voltage source and voltage meter of AC mode, and returns the output voltage value which is used in the calibration.

■ **:CALibration:SAFEty:AC:VOLTage (range):FULL:BEST?**

Change to the offset item of voltage source and voltage meter of AC mode, and returns the best value that is selected by device.

■ **:CALibration:SAFEty:AC:CRANge? { MAXimum, MINimum }**

Query the maximum and minimum of the range of the current meter of the AC mode.

■ **:CALibration:SAFEty:AC:CURRent (range):OFFSet[:SOURce] [:VOLTage] [<Numeric Value>]**

Change to the offset item of current meter of AC mode, and set the output voltage value that is used in the calibration. The header suffix (range) is selected the range of current.

■ **:CALibration:SAFEty:AC:CURRent (range):OFFSet[:SOURce] [:VOLTage] ?**

Change to the offset item of current meter of AC mode, and returns the output voltage value which is used in the calibration.

■ **:CALibration:SAFEty:AC:CURRent (range):OFFSet:BEST?**

Change to the offset item of current meter of AC mode, and returns the best value that is selected by device.

■ **:CALibration:SAFEty:AC:CURRent (range):FULL[:SOURce] [:VOLTage] [<Numeric Value>]**

Change to the full item of current meter of AC mode, and set the output voltage value that is used in the calibration.

■ **:CALibration:SAFEty:AC:CURRent (range):FULL[:SOURce] [:VOLTage] ?**

Change to the full item of current meter of AC mode, and returns the output voltage value which is used in the calibration.

■ **:CALibration:SAFEty:AC:CURRent (range):FULL:BEST?**

Change to the full item of current meter of AC mode, and returns the best value that is selected by device.

■ **:CALibration:SAFEty:AC:RCRAnge? { MAXimum, MINimum }**

Query the maximum and minimum of the range of the real current meter of the AC mode.

■ **:CALibration:SAFEty:AC:RCURrent (range):OFFSet[:SOURce] [:VOLTage] [<Numeric Value>]**

Change to the offset item of the real current meter of AC mode, and set the output voltage value that is used in the calibration. The header suffix (range) is selected the range of current

■ **:CALibration:SAFEty:AC:RCURrent (range):OFFSet[:SOURce] [:VOLTage] ?**

Change to the offset item of the real current meter of AC mode, and returns the output voltage value which is used in the calibration.

■ **:CALibration:SAFEty:AC:RCURrent (range):OFFSet:BEST?**

Change to the offset item of real current meter of AC mode, and returns the best value that is selected by device.

■ **:CALibration:SAFEty:AC:RCURrent (range):FULL[:SOURce] [:VOLTage] [<Numeric Value>]**

Change to the full item of the real current meter of AC mode, and set the output voltage value that is used in the calibration.

■ **:CALibration:SAFEty:AC:RCURrent (range):FULL[:SOURce] [:VOLTage] ?**

Change to the full item of the real current meter of AC mode, and returns the output voltage value which is used in the calibration.

■ **:CALibration:SAFEty:AC:RCURrent (range):FULL:BEST?**

Change to the full item of real current meter of AC mode, and returns the best value that is selected by device.

■ **:CALibration:SAFEty:AC:ARANge? {MAXimum, MINimum }**

Query the maximum and minimum of the range of the arc meter of the AC mode.

■ **:CALibration:SAFEty:AC:ARC (range):SLOPe[:SOURce] [:VOLTage] [<Numeric Value>]**

Change to the arc item of AC mode, and set the output voltage value that is used in the calibration.

■ **:CALibration:SAFEty:AC:ARC (range):SLOPe[:SOURce] [:VOLTage] ?**

Change to the arc item of AC mode, and returns the output voltage value which is used in the calibration.

■ **:CALibration:SAFEty:AC:ARC (range):SLOPe:LEVel [<Numeric Value>]**

Change to the arc item of AC mode, and set the arc limit value.

■ **:CALibration:SAFEty:AC:ARC (range):SLOPe:LEVel?**

Change to the arc item of AC mode, and returns the arc limit value.

■ **:CALibration:SAFEty:AC:ARC (range):SLOPe:BEST?**

Change to the arc item of AC mode, and returns the best arc limit value that is selected by device.

■ **:CALibration:SAFEty:DC:VRANge? {MAXimum, MINimum}**

Query the maximum and minimum of the range of the voltage source and meter of the DC mode.

■ **:CALibration:SAFEty:DC:VOLTage (range):OFFSet[:SOURce] [:VOLTage] [<Numeric Value>]**

Change to the offset item of the voltage source and voltage meter of DC mode, and set the output voltage value that is used in the calibration.

■ **:CALibration:SAFEty:DC:VOLTage (range):OFFSet[:SOURce] [:VOLTage] ?**

Change to the offset item of the voltage source and voltage meter of DC mode, and returns the output voltage value which is used in the calibration.

■ **:CALibration:SAFEty:DC:VOLTage (range):OFFSet:BEST?**

Change to the offset item of voltage source and voltage meter of DC mode, and returns the best value that is selected by device.

■ **:CALibration:SAFEty:DC:VOLTage (range):FULL[:SOURce] [:VOLTage] [<Numeric Value>]**

Change to the offset item of voltage source and voltage meter of DC mode, and set the output voltage value that is used in the calibration.

■ **:CALibration:SAFEty:DC:VOLTage (range):FULL[:SOURce] [:VOLTage] ?**

Change to the offset item of voltage source and voltage meter of DC mode, and

returns the output voltage value which is used in the calibration.

■ **:CALibration:SAFEty:DC:VOLTage (range):FULL:BEST?**

Change to the offset item of voltage source and voltage meter of DC mode, and returns the best value that is selected by device.

■ **:CALibration:SAFEty:DC:CRANge? { MAXimum, MINimum }**

Query the maximum and minimum of the range of the current meter of the DC mode.

■ **:CALibration:SAFEty:DC:CURRent (range):OFFSet[:SOURce] [:VOLTage] [<Numeric Value>]**

Change to the offset item of current meter of DC mode, and set the output voltage value that is used in the calibration. The header suffix (range) is selected the range of current

■ **:CALibration:SAFEty:DC:CURRent (range):OFFSet[:SOURce] [:VOLTage] ?**

Change to the offset item of current meter of DC mode, and returns the output voltage value which is used in the calibration.

■ **:CALibration:SAFEty:DC:CURRent (range):OFFSet:BEST?**

Change to the offset item of current meter of DC mode, and returns the best value that is selected by device.

■ **:CALibration:SAFEty:DC:CURRent (range):FULL[:SOURce] [:VOLTage] [<Numeric Value>]**

Change to the full item of current meter of DC mode, and set the output voltage value that is used in the calibration.

■ **:CALibration:SAFEty:DC:CURRent (range):FULL[:SOURce] [:VOLTage] ?**

Change to the full item of current meter of DC mode, and returns the output voltage value which is used in the calibration.

■ **:CALibration:SAFEty:DC:CURRent (range):FULL:BEST?**

Change to the full item of current meter of DC mode, and returns the best value that is selected by device.

■ **:CALibration:SAFEty:DC:ARANge? {MAXimum, MINimum }**

Query the maximum and minimum of the range of the arc meter of the DC mode.

■ **:CALibration:SAFEty:DC:ARC (range):SLOPe[:SOURce] [:VOLTage] [<Numeric Value>]**

Change to the arc item of DC mode, and set the output voltage value that is used in the calibration.

■ **:CALibration:SAFEty:DC:ARC (range):SLOPe[:SOURce] [:VOLTage] ?**

Change to the arc item of DC mode, and returns the output voltage value which is used in the calibration.

■ **:CALibration:SAFEty:DC:ARC (range):SLOPe:LEVel [<Numeric Value>]**

Change to the arc item of DC mode, and set the arc limit value.

■ **:CALibration:SAFEty:DC:ARC (range):SLOPe:LEVel?**

Change to the arc item of DC mode, and returns the arc limit value.

■ **:CALibration:SAFEty:DC:ARC (range):SLOPe:BEST?**

Changing to the arc item of DC mode, and returns the best arc limit value that is selected by device.

■ **:CALibration:SAFEty:IR:VRANge? {MAXimum, MINimum }**

Query the maximum and minimum of the range of the voltage source and meter of the IR mode.

■ **:CALibration:SAFEty:IR:VOLTage (range):OFFSet[:SOURce] [:VOLTage] [<Numeric Value>]**

Change to the offset item of the voltage source and voltage meter of IR mode, and set the output voltage value that is used in the calibration.

■ **:CALibration:SAFEty:IR:VOLTage (range):OFFSet[:SOURce] [:VOLTage] ?**

Change to the offset item of the voltage source and voltage meter of IR mode, and returns the output voltage value which is used in the calibration.

■ **:CALibration:SAFEty:IR:VOLTage (range):OFFSet:BEST?**

Change to the offset item of voltage source and voltage meter of IR mode, and returns the best value that is selected by device.

■ **:CALibration:SAFEty:IR:VOLTage (range):FULL[:SOURce] [:VOLTage] [<Numeric Value>]**

Change to the full item of voltage source and voltage meter of IR mode, and set the output voltage value that is used in the calibration.

■ **:CALibration:SAFEty:IR:VOLTage (range):FULL[:SOURce] [:VOLTage] ?**

Change to the full item of voltage source and voltage meter of IR mode, and returns the output voltage value which is used in the calibration.

■ **:CALibration:SAFEty:IR:VOLTage (range):FULL:BEST?**

Change to the full item of voltage source and voltage meter of IR mode, and returns the best value that is selected by device.

■ **:CALibration:SAFEty:IR:RRANge? { MAXimum, MINimum }**

Query the maximum and minimum of the range of the resistance meter of the IR mode.

■ **:CALibration:SAFEty:IR:RESistance (range):SLOPe[:SOURce] [:VOLTage] [<Numeric Value>]**

Change to the resistance item of IR mode, and set the output voltage value that

is used in the calibration.

■ **:CALibration:SAFEty:IR:RESistance (range):SLOPe[:SOURce] [:VOLTage] ?**

Change to the resistance item of IR mode, and returns the output voltage value which is used in the calibration.

■ **:CALibration:SAFEty:IR:RESistance (range):SLOPe:BEST?**

Change to the resistance item of IR mode, and returns the best value that is selected by device.

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