Electrical Safety Tester

GPT-9000 / GPT-9000A Series

USER MANUAL
GW INSTEK PART NO. 82PT-90000EH1

ISO-9001 CERTIFIED MANUFACTURER

GWINSTEK

Table of Contents

SAFETY INSTRUCTIONS

This chapter contains important safety instructions that you must follow during operation and storage. Read the following before any operation to ensure your safety and to keep the instrument in the best possible condition.

Safety Symbols

These safety symbols may appear in this manual or on the instrument.

⚠ WARNING	Warning: Identifies conditions or practices that could result in injury or loss of life.
⚠ CAUTION	Caution: Identifies conditions or practices that could result in damage to the instrument or to other properties.
⚠	DANGER High Voltage
⚠	Attention Refer to the Manual
⏚	Protective Conductor Terminal
⏚	Frame or Chassis Terminal
⏚	Earth (ground) Terminal

Do not dispose electronic equipment as unsorted municipal waste. Please use a separate collection facility or contact the supplier from which this instrument was purchased.

Safety Guidelines

General Guideline

⚠ CAUTION

- Do not place any heavy object on the instrument.

- Avoid severe impact or rough handling that leads to damaging the instrument.

- Do not discharge static electricity to the instrument.

- Use only mating connectors, not bare wires, for the terminals.

- Do not block the cooling fan opening.

- Do not disassemble the GPT-9000/GPT-9000A unless you are qualified.

(Measurement categories) EN 61010-1:2010 specifies the measurement categories and their requirements as follows. The GPT-9000/GPT-9000A does not fall under category II, III or IV.

- Measurement category IV is for measurement performed at the source of low-voltage installation.

- Measurement category III is for measurement performed in the building installation.

- Measurement category II is for measurement performed on the circuits directly connected to the low voltage installation.

Power Supply

⚠ WARNING

- AC Input voltage range: 100/120/220/230VAC ±10%

- Frequency: 50Hz/60Hz

- To avoid electrical shock connect the protective grounding conductor of the AC power cord to an earth ground.

Cleaning the GPT-9000/ GPT-9000A	• Disconnect the power cord before cleaning.
	• Use a soft cloth dampened in a solution of mild detergent and water. Do not spray any liquid.
	• Do not use chemicals containing harsh material such as benzene, toluene, xylene, and acetone.

Operation Environment	• Location: Indoor, no direct sunlight, dust free, almost non-conductive pollution (Note below)
	• Relative Humidity: ≤ 70% (no condensation)
	• Altitude: < 2000m
	• Temperature: 0˚C~40˚C

(Pollution Degree) EN 61010-1:2010 specifies the pollution degrees and their requirements as follows. The GPT-9000/GPT-9000A falls under degree 2.

Pollution refers to "addition of foreign matter, solid, liquid, or gaseous (ionized gases), that may produce a reduction of dielectric strength or surface resistivity".

• Pollution degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.

• Pollution degree 2: Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.

• Pollution degree 3: Conductive pollution occurs, or dry, non-conductive pollution occurs which becomes conductive due to condensation which is expected. In such conditions, equipment is normally protected against exposure to direct sunlight, precipitation, and full wind pressure, but neither temperature nor humidity is controlled.

Storage environment	• Location: Indoor
	• Temperature: -10°C to 70°C
	• Relative Humidity: ≤ 85% (no condensation)

| Disposal | Do not dispose this instrument as unsorted municipal waste. Please use a separate collection facility or contact the supplier from which this instrument was purchased. Please make sure discarded electrical waste is properly recycled to reduce environmental impact. |

Power cord for the United Kingdom

When using the safety tester in the United Kingdom, make sure the power cord meets the following safety instructions.

NOTE: This lead/appliance must only be wired by competent persons

⚠️ WARNING: THIS APPLIANCE MUST BE EARTHED

IMPORTANT: The wires in this lead are coloured in accordance with the following code:

Green/ Yellow:	Earth	
Blue:	Neutral	
Brown:	Live (Phase)	

As the colours of the wires in main leads may not correspond with the coloured marking identified in your plug/appliance, proceed as follows:

The wire which is coloured Green & Yellow must be connected to the Earth terminal marked with either the letter E, the earth symbol ⏚ or coloured Green/Green & Yellow.

The wire which is coloured Blue must be connected to the terminal which is marked with the letter N or coloured Blue or Black.

The wire which is coloured Brown must be connected to the terminal marked with the letter L or P or coloured Brown or Red.

If in doubt, consult the instructions provided with the equipment or contact the supplier.

This cable/appliance should be protected by a suitably rated and approved HBC mains fuse: refer to the rating information on the equipment and/or user instructions for details. As a guide, a cable of 0.75mm² should be protected by a 3A or 5A fuse. Larger conductors would normally require 13A types, depending on the connection method used.

Any exposed wiring from a cable, plug or connection that is engaged in a live socket is extremely hazardous. If a cable or plug is deemed hazardous, turn off the mains power and remove the cable, any fuses and fuse assemblies. All hazardous wiring must be immediately destroyed and replaced in accordance to the above standard.

GETTING STARTED

This chapter describes the safety tester in a nutshell, including its main features and front / rear panel introduction. After going through the overview, please read the safety considerations in the Set Up chapter.

GPT-9000/9000A Series Overview

Series lineup

The GPT-9000/9000A Series Safety Testers are AC/DC withstanding voltage, insulation resistance and ground bond safety testers.

The GPT-9801/9901A are AC withstanding voltage testers, the GPT-9802/9902A are AC/DC withstanding voltage testers and the GPT-9803/9903/9903A are AC/DC withstanding voltage and insulation resistance testers. The GPT-9804 & GPT-9904 include all the test functions of the other models as well as ground bond testing. All models can operate at up to 5kVAC for AC withstanding voltage testing and at up to 6kVDC for DC withstanding voltage testing (excluding the GPT-9801/9901A).

For the GPT-99XX/99XXA models, the testing terminals are also mirrored on the rear panel for added safety and for more permanent safety testing environments. They also include an innovative sweep function to view test results as a graph.

The GPT-9000/9000A Series can store up to 100 manual tests, as well as run up to 16 manual tests sequentially as an automatic test, allowing the safety testers to accommodate any number of safety standards, including IEC, EN, UL, CSA, GB, JIS and others.

Note: Throughout this user manual, the terms ACW, DCW, IR and GB refer to AC Withstanding, DC Withstanding, Insulation Resistance and Ground Bond testing, respectively. GPT-9000 refers to any of the GPT-98XX or GPT-99XX models, GPT-9000A refers to any of the GPT-99XXA models.

Model Overview

Model name	ACW	DCW	IR	GB	Sweep
GPT-9801	✓				
GPT-9802	✓	✓			
GPT-9803	✓	✓	✓		
GPT-9804	✓	✓	✓	✓	
GPT-9901A	✓				✓
GPT-9902A	✓	✓			✓
GPT-9903	✓	✓	✓		✓
GPT-9903A	✓	✓	✓		✓
GPT-9904	✓	✓	✓	✓	✓

Main Features

Performance
- ACW: 5kVAC
- DCW: 6kVDC
- IR: 50V~1000V (50V steps)*
- GB: 3A~30A (GPT-98XX);
    3A~32A (GPT-99XX)

* The GPT-99XX/99XXA also includes an extra
    +125V test point

Features	• Ramp up time control
	• Safety discharge
	• 100 test conditions (MANU mode)
	• 100 automatic tests (AUTO mode)
	• Over temperature, voltage and current protection
	• Pass, Fail, Test, High Voltage and Ready indicators
	• PWM output (90% efficiency, increased reliability)
	• Interlock (configurable)
	• Sweep Function
	• Rear panel output (GPT-9000 series only)
Interface	• Remote control start/stop interface terminal
	• RS232/USB interface for programming
	• Optional GPIB interface for programming
	• Signal I/O port for pass/fail/test monitoring and start/stop control/interlock

Accessories

Standard Accessories	Part number	Description
	GHT-114 x1	Test lead
	Region dependent	Power cord
	GTL-115 x1 or GTL-215 x1	GB Test leads (A random type will be shipped. GPT-9804/9904 only)
	N/A	Remote terminal male plug
	N/A	Interlock key

Optional Accessories	Part number	Description
	GHT-205	High Voltage Test Probe
	GHT-113	High Voltage Test Pistol
	GTL-232	RS232C cable
	GTL-248	GPIB cable
	GTL-247	USB cable
	GRA-417	Rack Adapter Panel (19", 4U) (GPT-9801/9802/9803/ 9804/9901A/9902A/9903A only)
	GRA-433	Rack Adapter Panel (19", 4U) (GPT-9903A/9904A only)
Options	Part number	Description
GPT-9KG1	Opt.01 GPIB Interface	GPIB module

Package Contents

Check the contents before using the GPT-9000/GPT-9000A.

Opening the box
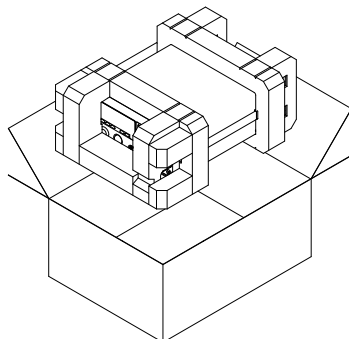
Contents
(single unit)

- GPT-9000/9000A unit
- Quick Start guide
- User manual CD
- CTC (Calibration Traceable Certificate)
- Power cord x1 (region dependent)

- GHT-114 test leads x1
- GTL-215 test leads x1 (GPT-9804/9904)
- Remote terminal male plug
- Interlock key

⚠ Note

Keep the packaging, including the box, polystyrene foam and plastic envelopes should the need arise to return the unit to GW Instek.
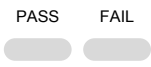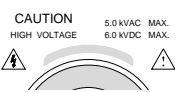
Appearance

GPT-9801/9802/9803/9901A/9902A/9903/9903A Front Panel
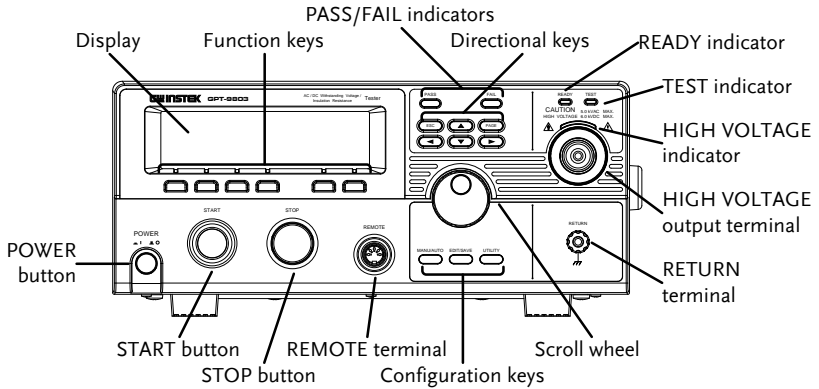
GPT-9804/9904 Front Panel
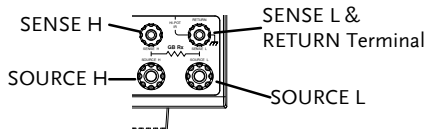
Display	240 X 64 dot matrix display (LCD)	
Function keys	The function keys correspond to the soft-keys directly above on the main display.	
Pass/Fail indicators	PASS FAIL	The PASS and FAIL indicators light up upon a PASS or FAIL test result at the end of a manual test or automatic test.
ESC key	ESC	The ESC key is used to exit out of a menu or cancel a setting.
PAGE key	PAGE	The PAGE key is used to view automatic test information and test results.
Directional arrow keys	▲ ◄ ▼ ►	The directional arrow keys are used to navigate menus and parameter settings.
READY indicator	READY	The READY indicator is lit when the tester is ready to begin testing. The STOP button is used to put the tester into READY status.
TEST indicator	TEST	The TEST indicator is lit when a test is on. The START button is used to put the tester into TEST status.
HIGH VOLTAGE indicator	CAUTION HIGH VOLTAGE 5.0 kVAC MAX. 6.0 kVDC MAX. ⚠ ⚠	The HIGH VOLTAGE indicator will light up when an output terminal is active. Only after the test has finished or stopped will the indicator turn off.

HIGH VOLTAGE
output terminal
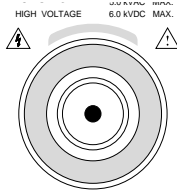
The HIGH VOLTAGE terminal output is used for outputting the testing voltage. The terminal is recessed for safety. This terminal is used in conjunction with the RETURN terminal.

⚠ **WARNING**
USE EXTREME CAUTION.
Do not touch the HIGH VOLTAGE terminal during testing.

RETURN terminal

All models except GPT-9804/9904
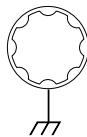
RETURN

The RETURN terminal is used for IR, DCW and ACW tests.

RETURN, SENSE and SOURCE terminals

GPT-9804/9904

HI-POT
IR   RETURN

SENSE H   **GB Rx**   SENSE L
SOURCE H   SOURCE L
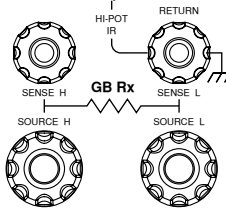
The RETURN terminal is used for IR, DCW and ACW tests.

The SOURCE H, SOURCE L, SENSE H and SENSE L terminals are used for GB tests.

Scroll wheel
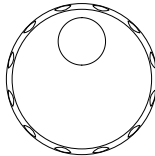
The scroll wheel is used to edit parameter values.

UTILITY key

UTILITY

Used to enter the MANU Utility or Common Utility menu.

EDIT/SAVE key	EDIT/SAVE	Used to start editing MANU/AUTO tests as well as save settings and parameters.
MANU/AUTO key	MANU/AUTO	The MANU/AUTO key is used to select manual tests (MANU) or automatic tests (AUTO).
REMOTE terminal	REMOTE	The REMOTE terminal is used to connect to a remote controller.
STOP button	STOP	The STOP button is used to stop/cancel tests. The STOP button will also put the safety tester in the READY status to begin testing.
START button	START	The START button is used to start tests. The START button can be used to start tests when the tester is in the READY status. Pressing the START button will put the tester in the TEST status.
POWER switch	POWER I O	Turns the power on. The safety tester will always start up with the setting which was performed and executed from the last test.
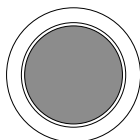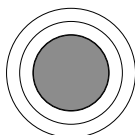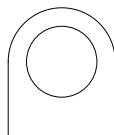
GPT-9801/9802/9803/9804 Rear Panels

SIGNAL I/O   USB A port   RS232 port   Fan   GND

Optional GPIB port   Line voltage   Fuse selector
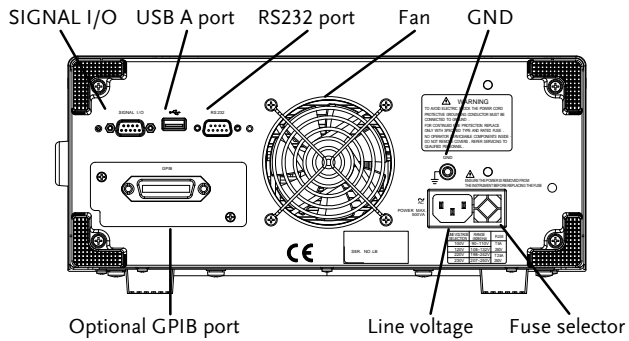
GPT-9901A/9902A/9903/9903A Rear Panel

High voltage terminal

Signal I/O, RS232 & USB port   Fan vents

Return terminal

GND

Optional GPIB port   Line voltage   Fuse selector
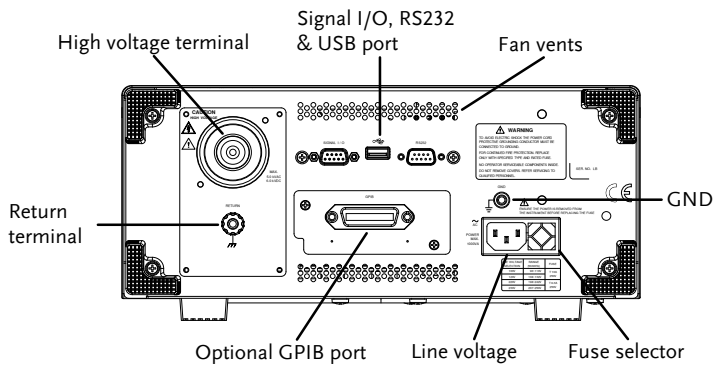
GPT-9904 Rear Panel
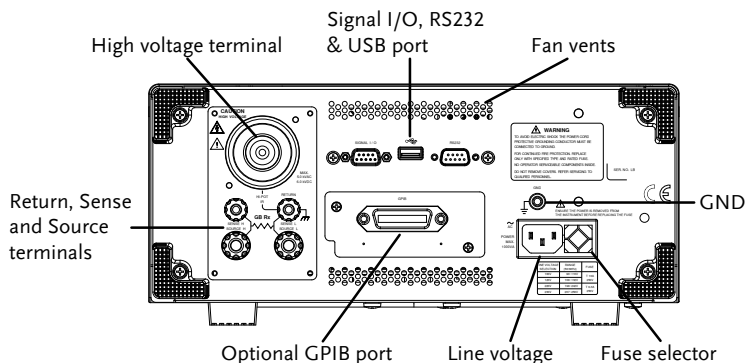
SIGNAL I/O port
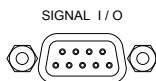
SIGNAL I/O

The SIGNAL I/O port is used to monitor the tester status (PASS, FAIL, TEST) and input (START/STOP signals). It is also used with the Interlock key.

USB A port

Used for remote control.

RS232 interface port

RS232
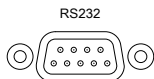
Used for remote control and firmware updates.

Fan/Fan Vents

Exhaust fan. Allow enough room for the fan to vent. Do not block the fan openings.

GND

GND
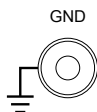
Connect the GND (ground) terminal to the earth ground.

Line voltage input
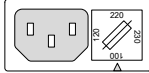
Line voltage input:
100/120/220/230VAC ±10%

Line voltage fuse
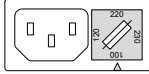
Line voltage selector and fuse:

GPT-98XX:
100V/120V   T5A 250V
220V/230V   T2.5A 250V

GPT-99XX/99XXA:
100V/120V   T10A 250V
220V/230V   T6.3A 250V

Optional GPIB port
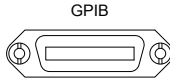
GPIB

Optional GPIB interface for remote control.

HIGH VOLTAGE output terminal

GPT-99XX /99XXA

CAUTION
HIGH VOLTAGE

MAX.
5.0 kVAC
6.0 kVDC
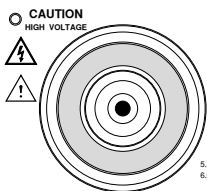
The HIGH VOLTAGE terminal output is used for outputting the testing voltage.

⚠ WARNING
USE EXTREME CAUTION.
Do not touch the HIGH VOLTAGE terminal during testing.

RETURN terminal

GPT-9901A/9902A/ 9903/9903A

RETURN
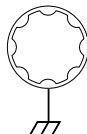
The RETURN terminal is used for IR, DCW and ACW tests.

RETURN/
SENSE and
SOURCE
terminals

GPT-9904
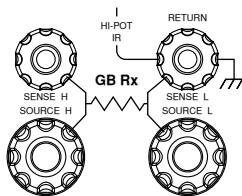
The RETURN terminal is used for IR, DCW and ACW tests.

The SOURCE L/H and SENSE L/H terminals are for GB tests only.

Set Up

Line Voltage Connection and Power Up

Background   Before powering up the GPT-9000/9900A
                    ensure the correct voltage has been selected on
                    the rear panel. The GPT-9000/9000A supports
                    line voltages of 100V/120V/220V and 230V.

Steps   1. Check the line voltage and the fuse Page 168
                  in the fuse holder.

                  The desired line voltage
                  should line up with the
                  arrow on the fuse holder.
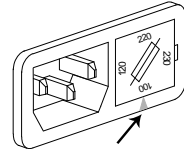
               2. Connect the power cord to
                  the AC voltage input.
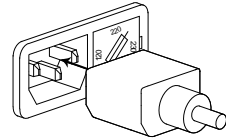
               3. If the power cord does not
                  have an earth ground,
                  ensure the ground
                  terminal is connected to an
                  earth ground.
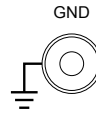
⚠ Warning   Ensure the power cord is connected to an earth
                   ground. Failure could be harmful to the operator
                   and instrument.

               4. Press the Power button.
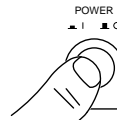
5. When the unit is powering up, all the LED indicators will light. Check to make sure all 5 LED indicators are working.

6. Check to make sure the System Self Test passes without errors.

```
SYSTEM  SELF  TEST
System Checking...
Hardware Checking...
Firmware Checking...
■■■■■■■■■■■■■■■■■■■■■■■
```
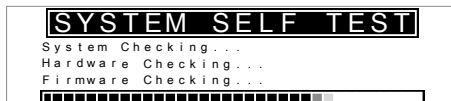
After the System Self Test completes, the tester will go into VIEW status and be ready to operate.

VIEW status

```
MANU=***-002   MANU_NAME        REF#=00.00mA
FREQ=  60Hz   HI SET=01.00mA
0.100kV                mA       V I EW
              RAMP/=000.1S       TIMER=001.0S
ACW    DCW     IR     GB    ⏚
```
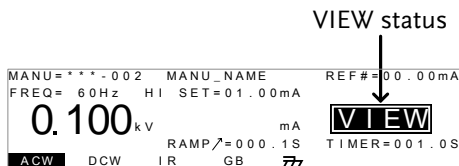
Installing the Optional GPIB Card

Background   The optional GPIB is a user-installable option.
                      Follow the instructions below to install the
                      GPIB card.

⚠ WARNING   Before installing the optional GPIB card ensure the
                      GPT-9000/9000A is turned off and disconnected
                      from power.

Steps   1.   Remove the screws from the rear panel cover
                      plate.
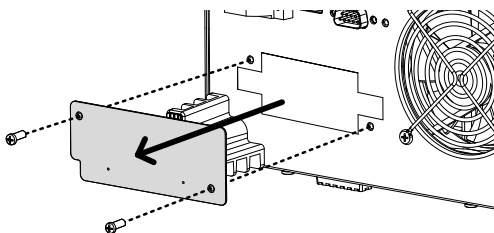
                 2.   Insert the GPIB card into the two slots on either
                      side of the opening. Push the card gently until it
                      is fully inserted.
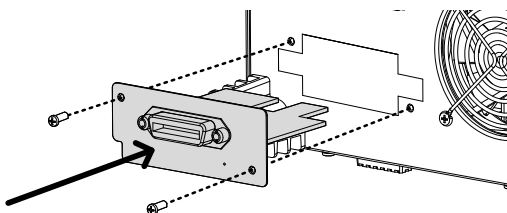
Workplace Precautions

Background   The GPT-9000/9900A is a high voltage
                          instrument that outputs dangerous voltages.
                          The following section describes precautions and
                          procedures that must be followed to ensure a
                          safe work environment.

⚠️ WARNING   The GPT-9000/9000A generates voltages in excess
                          of 5kVAC or 6kVDC. Follow all safety precautions,
                          warnings and directions given in the following
                          section when using the instrument.

1. Only technically qualified personnel should be allowed to operate the safety tester.

2. The operating workplace must be fully isolated, especially when the instrument is in operation. The instrument should be clearly labeled with appropriate warning signage.

3. The operator should not wear any conductive materials, jewelry, badges, or other items, such wrist watches.

4. The operator should wear insulation gloves for high voltage protection.

5. Ensure the earth ground of the line voltage is properly grounded.

6. Ensure any devices that are adversely affected by magnetic fields are not placed near the tester.

Operating Precautions

Background	The GPT-9000/9000A is a high voltage instrument that outputs dangerous voltages. The following section describes precautions and procedures that must be followed to ensure that the tester is operated in a safe manner.
⚠ WARNING	The GPT-9000/9000A generates voltages of up to 5kVAC or 6kVDC. Follow all safety precautions, warnings and directions given in the following section when using the instrument.

1. Never touch the safety tester, lead wires, terminals, probes and other connected equipment when the tester is testing.

2. Do not turn the safety tester on and off quickly or repeatedly. When turning the power off, please allow a few moments before turning the power back on. This will allow the protection circuits to properly initialize.

   Do not turn the power off when a test is running, unless in an emergency.

3. Only use those test leads supplied with the instrument. Leads with inappropriate gauges can be dangerous to both the operator and the instrument.
   For GB testing, never use the Sense leads on the SOURCE terminals.

4. Do not short the HIGH VOLTAGE terminal with ground. Doing so could charge the chassis to dangerously high voltages.

5. Ensure the earth ground of the line voltage is properly grounded.

6. Only connect the test leads to the HIGH VOLTAGE/SOURCE H/SENSE H terminals before the start of a test. Keep the test leads disconnected at all other times.

7. Always press the STOP button when pausing testing.

8. Do not leave the safety tester unattended. Always turn the power off when leaving the testing area.

9. When remotely controlling the safety tester, ensure adequate safety measures are in place to prevent:

• Inadvertent output of the test voltage.

• Accidental contact with the instrument during testing. Ensure that the instrument and DUT are fully isolated when the instrument is remotely controlled.

10. Ensure an adequate discharge time for the DUT.

   When DCW or IR tests are performed, the DUT, test leads and probes become highly charged. The GPT-9000/9000A has discharge circuitry to discharge the DUT after each test. The time required for a DUT to discharge depends on the DUT and test voltage.

   Never disconnect the safety tester before a discharge is completed.

Basic Safety Checks

Background	The GPT-9000/9000A is a high voltage device and as such, daily safety checks should be made to ensure safe operation.

1. Ensure all test leads are not broken and are free from defects such as cracks or splitting.

2. Ensure the safety tester is always connected to an earth ground.

3. Test the safety tester operation with a low voltage/current output:
   Ensure the safety tester generates a FAIL judgment when the HIGH VOLTAGE and RETURN terminals are shorted (using the lowest voltage/current as the testing parameters).

⚠ WARNING	Do not use high voltages/currents when the HIGH VOLTAGE and RETURN terminals are shorted. It may result in damage to the instrument.

OPERATION

Menu Tree

This section describes the overall structure of the operation statuses and modes for the GPT-9000/9000A safety testers. The testers have two main testing modes (MANU, AUTO) and 5 main operation statuses (VIEW, EDIT, READY, TEST and STOP).
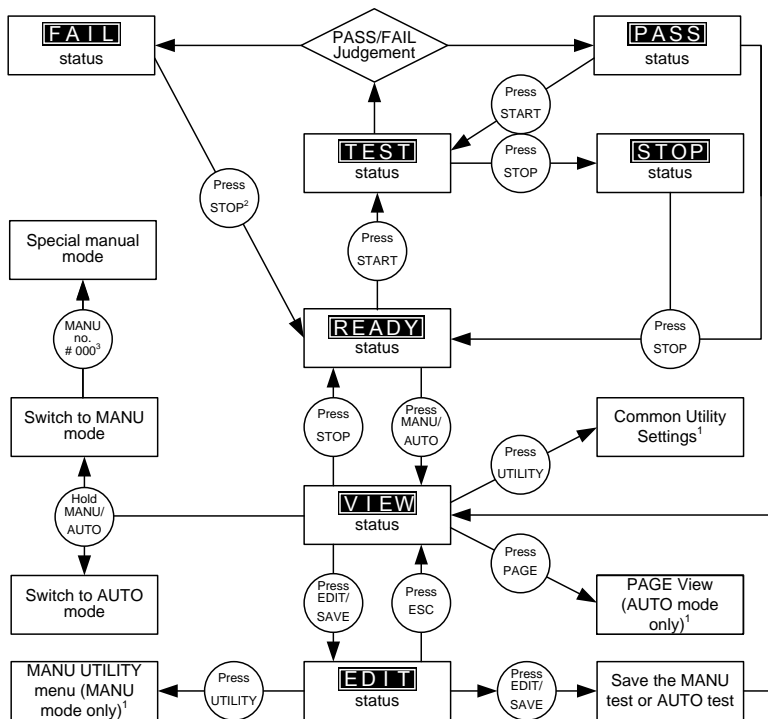
1 Press EDIT/SAVE to save settings, or ESC to cancel and return to the previous screen.
2 Press the STOP key twice for a FAIL result.
3 When in MANU mode, selecting MANU number 000 will enter the special manual mode.
4 The Sweep mode function is only accessible in the special manual mode.

Menu Tree Overview

VIEW status

VIEW status is used to view the parameters of the selected manual test/automatic test. The VIEW status is also used to put the tester into MANU or AUTO mode.

```
AUTO = 0 0 1 - 0 0 2    AUTO _ NAME          VIEW status
↕
MANU = * * * - 0 0 2    MANU _ NAME      REF # = 0 0 . 0 0mA
FREQ =  6 0Hz   H I  S E T = 0 1 . 0 0mA
   0.100 k V                       mA      VIEW
                       RAMP ↗ = 0 0 0 . 1 S   TIMER = 0 0 1 . 0 S
   ACW     DCW      I R      GB    ⏚
```
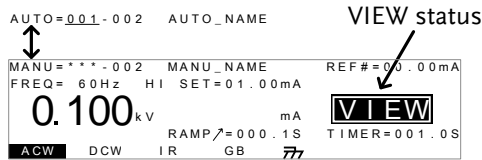
EDIT status

EDIT status is used to edit the manual test or automatic test parameters. Pressing the EDIT/SAVE key will save any changes. Pressing the ESC key will cancel any changes.

EDIT status

```
MANU = * * * - 0 0 2    MANU _ NAME      REF # = 0 0 . 0 0mA
FREQ =  6 0Hz   H I  S E T = 0 1 . 0 0mA
   0.100 k V                       mA      EDIT
                       RAMP ↗ = 0 0 0 . 1 S   TIMER = 0 0 1 . 0 S
   ACW     DCW      I R      GB    ⏚    HI / LO  TIMER
```
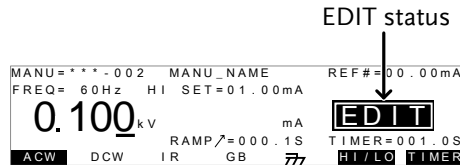
READY status

When the tester is in READY status, it is ready to begin testing. Pressing the START button will begin testing and put the tester into TEST status. Pressing the MANU/AUTO key will return the tester to VIEW status.

READY status

```
MANU = * * * - 0 0 2    MANU _ NAME      REF # = 0 0 . 0 0mA
FREQ =  6 0Hz   H I  S E T = 0 1 . 0 0mA
   0.100 k V                       mA      READY
                       RAMP ↗ = 0 0 0 . 1 S   TIMER = 0 0 1 . 0 S
   ACW     DCW      I R      GB    ⏚
```
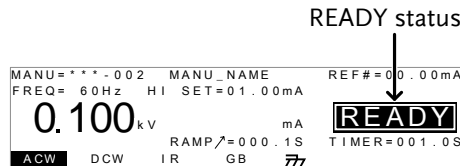
TEST status

TEST status is active when a MANU test or AUTO test is running. Pressing STOP will cancel the MANU test or the remaining steps in an AUTO test.

TEST status

```
MANU=***-002    MANU_NAME        REF#=00.00mA
FREQ=  60Hz   HI SET=01.00mA
   0.100kV  00.33mA          TEST
                RAMP⤢=000.1S   TIMER=001.0S
   ACW    DCW    IR    GB    ⏚
```
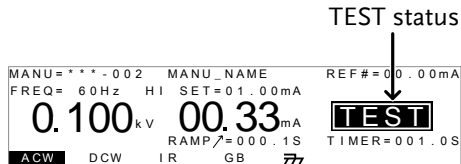
STOP status

STOP status is shown when a manual test or automatic test did not finish running and has been stopped by the operator. Pressing STOP will return the tester to READY status.

STOP status

```
MANU=***-002    MANU_NAME        REF#=00.00mA
FREQ=  60Hz   HI SET=01.00mA
   0.100kV  00.33mA          STOP
                RAMP⤢=000.1S   TIMER=001.0S
   ACW    DCW    IR    GB    ⏚
```
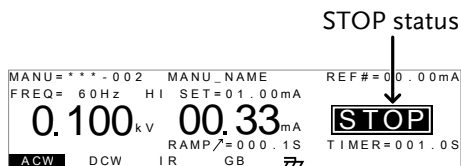
Page View

Up to 16 tests can be used to create an automatic test. Page View is used to see which manual tests (steps) an automatic test is composed of. The steps can be re-arranged and deleted in Page View.

```
AUTO=001-010   AUTO_NAME
MANU_NAME   ACW=0.100kV HI_SET=01.00mA
#01:010*   #02:001   #03:003   #04:004
#05:007    #06:003   #07:038   #08:005
#09:       #10:      #11:      #12:
#13:       #14:      #15:      #16:
MOVE   SWAP   SKIP    DEL
```
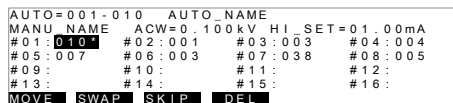
AUTO mode

AUTO indicates that the tester is in AUTO mode. AUTO mode is for creating/running a sequence of up to 16 MANU tests.

AUTO mode

```
AUTO=003-002   AUTO_NAME      REF#=00.00mA
FREQ= 60Hz  HI SET=01.00mA
  0.100kV           mA    ┌EDIT┐
               RAMP/=000.1S  TIMER=001.0S
  ACW    DCW    IR    GB   ⏚    ADD
```
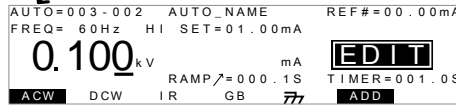
MANU mode

MANU mode is used to create and/or execute a single test. MANU indicates that the manual test mode is active.

MANU mode

```
MANU=***-002   MANU_NAME      REF#=00.00mA
FREQ= 60Hz  HI SET=01.00mA
  0.100kV           mA    ┌EDIT┐
               RAMP/=000.1S  TIMER=001.0S
  ACW    DCW    IR    GB   ⏚   HI/LO TIMER
```
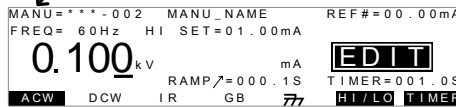
Common Utility Settings

This utility controls the LCD, buzzer, interface and control settings. These settings are system wide.

```
  COMMON  UTILITY
Start Ctrl:FRONT PANEL
Double Action:OFF
Key Lock:OFF        INTERLOCK:OFF
 LCD   BUZZ INTER CTRL
```
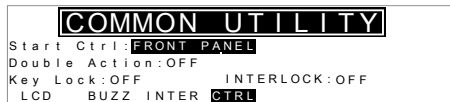
MANU Utility Settings

The Manu Utility settings are configured for each MANU test separately. The settings include: ARC MODE, PASS HOLD, FAIL MODE, MAX HOLD and GROUND MODE.

```
MANU=***-002   MANU UTILITY
ARC   MODE:OFF
PASS HOLD:OFF
FAIL MODE:STOP
MAX   HOLD:OFF
GROUND MODE:ON
```
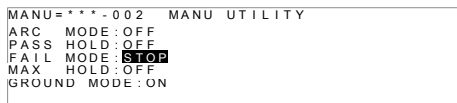
Test Lead Connection

This section describes how to connect the GPT-9000/GPT-9000A to a DUT for withstanding, insulation resistance or ground bond testing.

ACW, DCW, IR Connection

Background　　　　ACW, DCW and IR tests use the HIGH VOLTAGE terminal and RETURN terminal with the GHT-114 test leads.

ACW, DCW, IR Connection
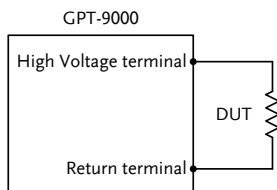
Steps
1. Turn the power off on the safety tester.

2. Connect the high voltage test lead(red) to the HIGH VOLTAGE terminal and screw firmly into place.

3. Connect the return test lead(white) into the RETURN terminal and screw the protector bar into place, as shown below.
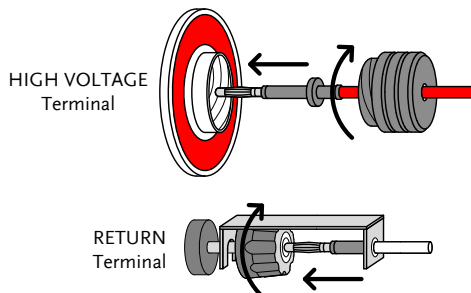
GB Connection

Background   GB tests use the SENSE H/L and SOURCE H/L terminals with the GTL-215 test leads.

GB Connection
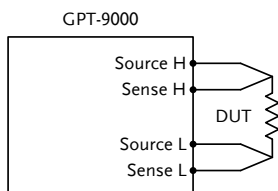
Steps   1. Turn the power off on the safety tester.

2. Connect the Sense H lead to the SENSE H terminal.

3. Connect the Sense L lead to the SENSE L terminal.

4. Connect the Source H lead to the SOURCE H terminal.

5. Connect the Source L lead to the SOURCE L terminal.
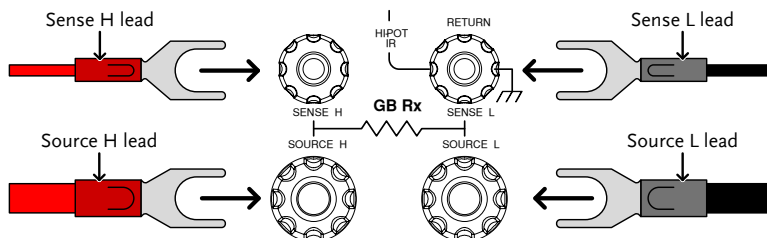
ACW, DCW, IR and GB Manual Testing

This section describes how to create, edit and run a *single* ACW, DCW, IR or GB safety test. Each Manual setting described in this chapter *only applies to the selected* manual test – *no other manual tests are affected.*

Each manual test can be stored/recalled to/from one of 100 memory locations. Each stored manual test can be used as a test step when creating an AUTO test (page 83).

- Choose/Recall a Manual Test number → from page 39.
- Edit Manual Test Settings → from page 40.
- Setting the Test Function→ from page 41.
- Setting the Test Voltage or Test Current→ from page 42.
- Setting the Test Frequency → from page 43.
- Setting the Upper and Lower Limits → from page 44.
- Setting a Reference Value → from page 46.
- Setting the Test Time (Timer) → from page 48.
- Setting the Ramp Up Time → from page 51.
- Creating a MANU Test File Name→ from page 52.
- Setting the ARC Mode → from page 53.
- Setting PASS HOLD→ from page 56.
- Setting FAIL MODE→ from page 57.
- Setting MAX HOLD→ from page 58.
- Setting the Grounding Mode → from page 59.
- Saving and Exiting EDIT Status→ from page 64.
- Running a MANU Test → from page 65.
- PASS / FAIL MANU Test → from page 70.
- Zeroing of the Test Leads (GB only) → from page 75
- Special MANU Test Mode (000) → from page 78

Before operating the GPT-9000/9000A please read the safety precautions as outlined in the Set Up chapter on page 23.
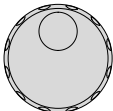
Choose/Recall a Manual Test Number

Background   ACW, DCW, IR and GB tests can only be
                  created in the MANU (manual) mode. MANU
                  number 001 to 100 can be saved and thus be
                  loaded when editing/creating a MANU test or
                  AUTO test. MANU number 000 is a special
                  mode. See page 75 for details on the special
                  mode.

Steps   1. If the tester is in AUTO mode,   MANU/AUTO
                 press and hold the MANU/AUTO
                 key for three seconds to switch to
                 MANU mode.

                 The tester can only switch between
                 AUTO and MANU mode when in
                 the VIEW status.

```
AUTO=001-002   AUTO_NAME              VIEW status
  ⇕
MANU=***-002   MANU_NAME      REF#=00.00mA
FREQ= 60Hz   HI  SET=01.00mA
  0.100kV                    mA      VIEW
                    RAMP↗=000.1S   TIMER=001.0S
  ACW    DCW     IR    GB     777
```
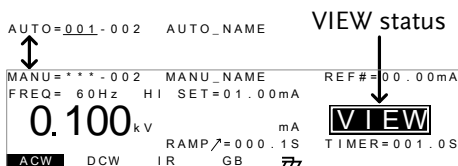
             2. Use the scroll wheel to choose the
                 MANU number.

                 MANU #   001~100
                           (MANU# 000 is a special mode)

```
         MANU number
             ↓
MANU=***-002   MANU_NAME      REF#=00.00mA
FREQ= 60Hz   HI  SET=01.00mA
  0.100kV                    mA      VIEW
                    RAMP↗=000.1S   TIMER=001.0S
  ACW    DCW     IR    GB     777
```
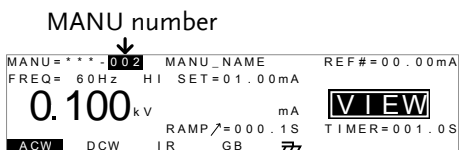
⚠️ Note

The MANU number can only be chosen in VIEW status. If in the EDIT status, switch to the VIEW status by pressing the EDIT/SAVE or ESC key.

Edit Manual Test Settings

Background

To edit any of the manual test settings, the tester must be in EDIT status.

Any settings or parameters that are edited only apply to the currently selected MANU number.

Steps

1. Press the EDIT/SAVE key when in VIEW status to enter the EDIT status. This will enter the EDIT status for the chosen test number.

EDIT/SAVE

V I E W

MANU=***-002   MANU_NAME   REF#=00.00mA
FREQ= 60Hz   HI SET=01.00mA
0.100 kV   mA   E D I T
                RAMP↗=000.1S   TIMER=001.0S
ACW   DCW   IR   GB   ⏚   HI/LO TIMER
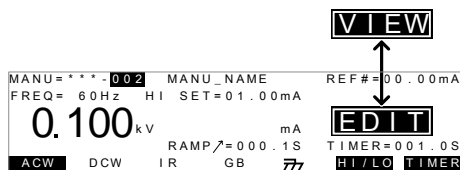
2. The Status changes from VIEW to EDIT.

⚠️ Note

Pressing the EDIT/SAVE key again will save the settings for the current test and return back to VIEW status.

Setting the Test Function

Background	After a MANU number has been chosen and the tester is in EDIT status, a test function can be set.
	There are four test functions, AC Withstand, DC Withstand, Insulation Resistance and Ground Bond.
Steps	1. To choose the test function, press the ACW, DCW, IR or GB soft-keys.

ACW   DCW   IR   GB

2. The test function soft-key is highlighted.

```
MANU=***-002    MANU_NAME        REF#=00.00mA
FREQ=  60Hz   HI  SET=01.00mA
0.100 kV                    mA      EDIT
                   RAMP/=000.1S   TIMER=001.0S
ACW    DCW     IR     GB    ╥╥    HI/LO  TIMER
```

↑
test function
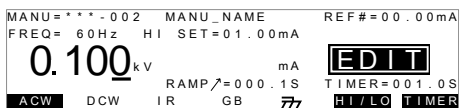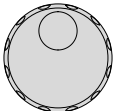
⚠ Note   The chosen test function only applies to the current test.

Setting the Test Voltage or Test Current

Background   The test voltage can be set from 0.050kV to 5kV
for ACW, 0.050kV to 6kV for DCW and 0.050 to
1kV for IR (50V steps*). For GB tests the test
current can be set from 3A to 30A (GPT-98XX)
or 3A to 32A (GPT-99XX).
*GPT-99XX/GPT-99XXA includes a 125V test
point.

Steps   1. Press the UP / DOWN arrow keys
to bring the cursor to the voltage
setting.

```
MANU=***-002   MANU_NAME        REF#=00.00mA
FREQ=  60Hz   HI SET=01.00mA
 0.100 kV              mA        ┌EDIT┐
                  RAMP↗=000.1S   TIMER=001.0S
  ACW   DCW     IR    GB    ⏚    HI/LO  TIMER
```

cursor
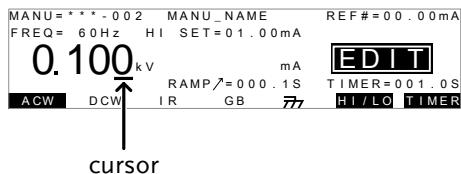
2. Use the scroll wheel to set the
voltage level.

ACW   0.050kV ~ 5kV [1]
DCW   0.050kV ~ 6kV [2]
IR   0.05kV ~ 1kV (50V steps) [3]
GB   3.00A ~ 33.00A (GPT-98XX)
           3.00A~ 33.00A (GPT-99XX)

[1] At least 0.5 seconds is needed to reach a set
voltage of 50V/10mA.
[2] At least 0.5 seconds is needed to reach a set
voltage of 50V/2mA.
[3] GPT-99XX/99XXA includes a 125V test point.

⚠ Note | When setting the voltage, be aware that a maximum of 200VA can be set for ACW and 50W for DCW (GPT-98XX) or 500VA and 100W, respectively for GPT-99XX/99XXA.

The ground bond voltage (GBV) is calculated as the HI SET limit x Test Current.

Setting the Test Frequency

Background | A test frequency of 60Hz or 50Hz can be set, regardless of the input line voltage. The test frequency setting only applies to ACW and GB tests.

Steps | 1. Press the UP / DOWN arrow keys to bring the cursor to the FREQ setting.

```
MANU=***-002   MANU_NAME        REF#=00.00mA
FREQ= 60Hz   HI  SET=01.00mA
  0.100 kV                 mA    EDIT
                 RAMP  =000.1S   TIMER=001.0S
  ACW    DCW    IR     GB    ⏚    HI/LO  TIMER
```
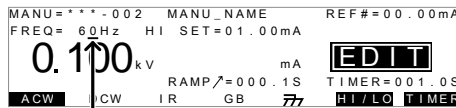
cursor

2. Use the scroll wheel to set the test frequency.
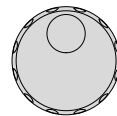
ACW, GB   50Hz, 60Hz

⚠ Note | The test frequency can only be set for ACW or GB tests.

Setting the Upper and Lower Limits

Background | There is both a LO and HI judgment setting. When the measured value is below the LO SET setting, the test will be judged as FAIL. When the value exceeds the HI SET setting the test will be judged as FAIL. Any measurement between the LO SET and HI SET setting is judged as PASS. The LO SET limit cannot be made greater than the HI SET limit.

Steps | 1. Press the HI/LO soft-key or use the UP / DOWN arrow keys to bring the cursor to the HI SET (ACW/DCW/GB) setting or the LO SET(IR) setting.

HI/LO

OR

▲

▼

```
MANU=***-002    MANU_NAME        REF#=00.00mA
FREQ= 60Hz   HI SET=01.00mA
  0.100 kV                    mA   EDIT
                   RAMP↗=000  1S   TIMER=001.0S
   ACW    DCW    IR    GB    ⏚    HI/LO  TIMER
```

cursor
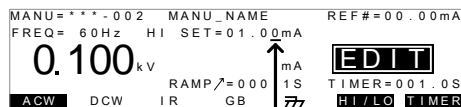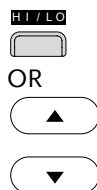
2. Use the scroll wheel to set the HI SET/LO SET limit*.
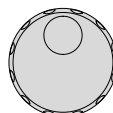
ACW (HI)	0.001mA~042.0mA (GPT-98XX)
	0.001mA~110.0mA (GPT-99XX/ 99XXA)
DCW (HI)	0.001mA~011.0mA (GPT-98XX)
	0.001mA~021.0mA (GPT-99XX/ 99XXA)
IR (LO)	0001MΩ ~ 9999MΩ (GPT-98XX)
	0.001GΩ ~ 50.00GΩ (GPT-99XX/ 99XXA)
GB (HI)	000.1mΩ ~ 650.0mΩ

3. Press the HI/LO soft-key again or press the DOWN arrow key to switch between HI SET and LO SET.

HI / LO
OR
▼

```
                    HI  SET=01.00mA
MANU=***-002   MANU NAME      REF#=00.00mA
FREQ= 60Hz    L0 SET=01.00mA
    0.100kV              mA    EDIT
                RAMP↗=000 1S    TIMER=001.0S
 ACW    DCW    IR    GB    ⏚   HI/LO  TIMER
```

cursor
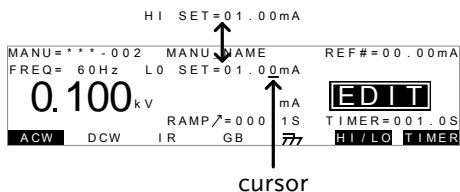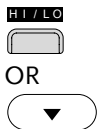
4. Use the scroll wheel to set the HI SET/LO SET limit*.
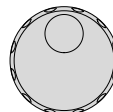
ACW (LO)	0.000mA~041.9mA (GPT-98XX) 0.000mA~109.9mA (GPT-99XX/ 99XXA)
DCW (LO)	0.000mA~010.9mA (GPT-98XX) 0.000mA~020.9mA (GPT-99XX/ 99XXA)
IR (HI)	0001MΩ~9999MΩ, ∞ (GPT-98XX) 0.001GΩ~50.00GΩ, ∞ (GPT-99XX/ 99XXA)
GB (LO)	000.0mΩ ~ 649.9mΩ

⚠ Note   *Please note that the resolution of the measured value depends on the resolution of HI SET setting.

⚠ Note   The LO SET setting is limited by the HI SET setting. The LO SET limit cannot be greater than the HI SET limit.

When setting the current, be aware that a maximum of 200VA can be set for ACW and 50W for DCW (GPT-98XX) or 500VA and 100W, respectively for GPT-99XX/99XXA.

Setting a Reference Value
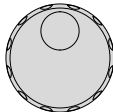
Background	The REF# acts as an offset. The REF# value is subtracted from the measured current (ACW, DCW) or measured resistance (IR, GB). When utilizing the REF function, it is imperative to take into consideration the errors associated with the measured values for the configuration of REF. If the measured values are in proximity to the judgement values (HIset LOset), the configured REF settings may yield determination outcomes lower than the measured values. For more information regarding the acceptable range of measurement errors, refer to the Specifications on page 165.

Steps

1. Press the UP / DOWN arrow keys to bring the cursor to the REF# setting.

cursor

```
MANU=***-002   MANU_NAME      REF#=00.00mA
FREQ= 60Hz   L0 SET=01.00mA
  0.100kV              mA    EDIT
             RAMP↗=000.1S   TIMER=001.0S
  ACW    DCW    IR    GB   ⏚   HI/LO  TIMER
```
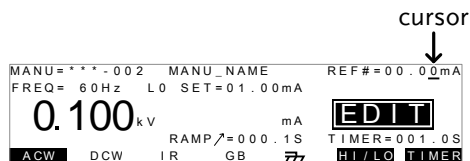
2. Use the scroll wheel to set the REF# value.

ACW	0.000mA~HI SET current-0.1mA
DCW	0.000mA~HI SET current-0.1mA
IR	0000MΩ~HI SETΩ-1MΩ
GB	000.0mΩ~HI SETΩ-0.1mΩ

| ⚠ Note | For GB tests, a reference offset can be automatically created using the zeroing function. See page 75 for details. |

Setting the Test Time (Timer)

Background   The TIMER setting is used to set the test time for the current test. The test time determines how long the test voltage or current is applied to the DUT. This test time does not include Ramp↗, initial start time or discharge time (note: GB does not have Ramp↗ or discharge times). The test time can be set from 0.5 seconds to 999.9 seconds for ACW, DCW and GB and 1.0 second to 999.9 seconds for IR, with a resolution of 0.1 seconds for all modes. The timer can be turned off when in the special MANU test mode when using the ACW or DCW test functions.

                         Each test has an initial test time of approximately 150ms and a discharge time (except GB). The total discharge time depends on the DUT and test voltage.
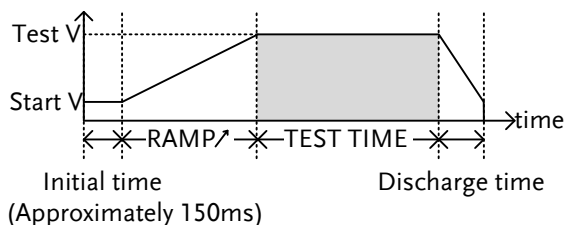
Steps   1. Press the TIMER soft-key or use the UP/DOWN arrow keys to bring the cursor to the TIMER setting.

```
MANU=***-002   MANU_NAME        REF#=00.00mA
FREQ= 60Hz   L0  SET=01.00mA
 0.100 kV                   mA    EDIT
                     RAMP↗=000.1S   TIMER=001.0S
 ACW    DCW    IR    GB   ⏚    HI/LO  TIMER
```
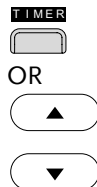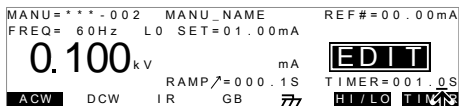
cursor

2. Use the scroll wheel to set the
   TIMER value.
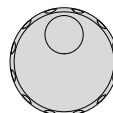
ACW	000.5s~999.9s
DCW	000.5s~999.9s
IR	001.0s~999.9s
GB	000.5s~999.9s

⚠ Note

With the ACW test function, when the test current
is between 30mA and 40mA (GPT-98XX) or 80mA
and 100mA (GPT-99XX/99XXA), the ramp time +
test time cannot exceed 240 seconds. At this
current level, the tester also needs to pause after a
test for a time equal to or greater than the output
time. See the specifications on page 171 for
details.

Special Manual
Mode

When in special MANU test mode (page 75) the
Timer can be turned off when using the DCW
or ACW test function.

Hold the TIMER soft-key for 3
seconds to turn the timer off.

TIMER

⚠ Note

The timer can only be turned off under special MANU test mode, however there is a limitation: The timer cannot be turned off (limited to 240s) if the test current is between 30mA and 40mA (GPT-98XX) or 80mA and 100mA (GPT-99XX/99XXA) in ACW mode.

The discharge time and initial test time cannot be edited.

Setting the Ramp Up Time

Background

The Ramp Up time is the total time taken for the tester to reach the test voltage level. The Ramp Up time starts after the initial time (approximately 150ms) with a start voltage of 50 volts. The Ramp Up time can be set from 000.1 to 999.9 seconds. The Ramp Up time is only applicable for ACW, DCW and IR tests.
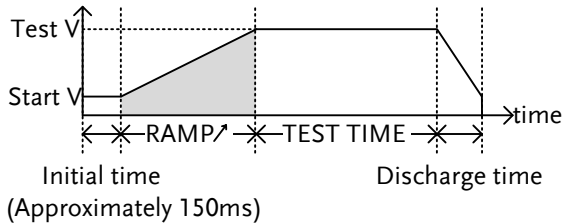
Steps

1. Use the UP/DOWN arrow keys to bring the cursor to the RAMP↗ setting.
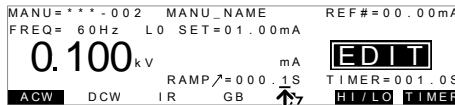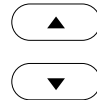
cursor

2. Use the scroll wheel to set the RAMP↗ value.
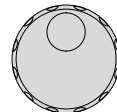
ACW	000.1s~999.9s
DCW	000.1s~999.9s
IR	000.1s~999.9s

⚠ Note

The discharge time and initial test time cannot be edited.

Creating a MANU Test File Name

Background   Each manual test can have a user-defined test
                      file name (default: MANU_NAME) up to 10
                      characters long. See the character list below for
                      the allowed characters.

Character List

0	1	2	3	4	5	6	7	8	9																
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
+	-	*	/	_	=	:	Ω	?	(	)	<	>	[	]											

Steps   1. Use the UP/DOWN arrow keys to
                     bring the cursor to the MANU test
                     file name at the top of the screen.
                     The test file name is initially set as
                     MANU_NAME.
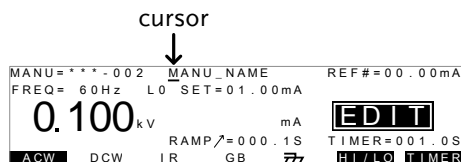
cursor
↓

```
MANU=***-002   MANU_NAME        REF#=00.00mA
FREQ=  60Hz   L0  SET=01.00mA
   0.100 kV              mA      EDIT
              RAMP↗=000.1S  TIMER=001.0S
  ACW    DCW      IR      GB    ⏚   HI/LO  TIMER
```

2. Use the scroll wheel to scroll
    through the available characters.
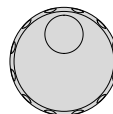
3. Press the Left/Right arrow keys to
    go the next character.

4. The MANU test file name is set when the
    current test setting is saved or when the cursor
    is moved to another setting.

Setting the ARC Mode

Background   ARC detection, otherwise known as flashover detection, detects fast voltage or current transients that are not normally detected. Arcing is usually an indicator of poor withstanding insulation, electrode gaps or other insulating problems that cause temporary spikes in current or voltage during ACW and DCW testing.

There are three ARC detection settings: OFF, ON AND CONTINUE, ON AND STOP. The ON AND CONTINUE setting will detect arcs over the ARC current level and continue the test, the ON AND STOP setting will stop the test when an arc is detected.

ARC mode settings only apply to ACW and DCW tests.

Steps   1. Press the UTILITY key on the front panel when the tester is in EDIT status. The tester will go to the MANU Utility for the *current test*.

UTILITY

```
MANU=***-002   MANU UTILITY
ARC   MODE:OFF
PASS HOLD:OFF
FAIL MODE:STOP
MAX   HOLD:OFF
GROUND MODE:ON
```

⚠ Note   The MANU UTILITY settings only apply to the selected MANU test.

2. Use the UP/DOWN arrow keys to move to the ARC MODE setting.

▲

▼

3. Use the scroll wheel to set the ARC mode.
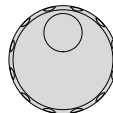
   ARC MODES: OFF, ON AND CONTINUE,
   　　　　　　　　　ON AND STOP

4. Press the EDIT/SAVE key to save and exit the MANU Utility and go back to EDIT status.

   EDIT/SAVE

```
MANU=***-002   MANU_NAME      REF#=00.00mA
FREQ= 60Hz   HI SET=01.00mA   ARC= 01.00mA
  0.100 kV                mA    EDIT
              RAMP↗=000.1S    TIMER=001.0S
  ACW   DCW   IR   GB   ⏚   HI/LO  TIMER
```

⚠ Note

The ESC key can be pressed at any time in the Utility menu to cancel and exit.

5. If the ARC MODE was set to either ON AND CONTINUE, or ON AND STOP, the ARC current level can be edited.

6. Use the UP/DOWN arrow keys to move the cursor to the ARC setting.

   ▲
   ▼

7. Use the scroll wheel to edit the ARC level.
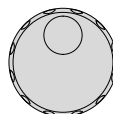
   GPT-98XX:

ACW	1.000mA~080.0mA
DCW	1.000mA~020.0mA

   GPT-99XX/99XXA:

ACW	2.000mA~200.0mA
DCW	2.000mA~040.0mA

⚠ Note   The ARC setting range is directly related to the HI SET current limit.

ACW: GPT-98XX

HI SET Limit	ARC Range
0.001mA~1.100mA	1.000mA ~2.000mA
01.11mA~11.00mA	01.00mA ~20.00mA
011.1mA~042.0mA	001.0mA ~080.0mA

ACW: GPT-99XX/99XXA

HI SET Limit	ARC Range
0.001mA~1.100mA	2.000mA
01.11mA~11.00mA	02.00mA ~20.00mA
011.1mA~110.0mA	002.0mA ~200.0mA

DCW: GPT-98XX

HI SET Limit	ARC Range
0.001mA~1.100mA	1.000mA ~2.000mA
01.11mA~11.00mA	01.00mA ~20.00mA

DCW: GPT-99XX/99XXA

HI SET Limit	ARC Range
0.001mA~1.100mA	2.000mA
01.11mA~11.00mA	02.00mA ~20.00mA
011.1mA~021.0mA	002.0mA ~040.0mA

Setting PASS HOLD

Background	The PASS HOLD settings only apply to the selected test in an AUTO test. When the PASS HOLD setting is set to ON, a PASS judgment is held until the START button is pressed.

⚠ Note   The PASS HOLD setting only applies to AUTO tests. This setting is ignored when running *a single* MANU test.

Steps   1. Press the UTILITY key on the front panel when the tester is in EDIT status. The display will go from the normal EDIT status to the MANU Utility menu for *the current test*.

UTILITY

```
MANU=***-002   MANU UTILITY
ARC   MODE:OFF
PASS HOLD:OFF
FAIL MODE:STOP
MAX   HOLD:OFF
GROUND MODE:ON
```

⚠ Note   The MANU UTILITY settings only apply to the selected MANU test.

2. Use the UP/DOWN arrow keys to move to the PASS HOLD setting.

▲
▼

3. Use the scroll wheel to set PASS HOLD.

PASS HOLD OFF, ON

4. Press the EDIT/SAVE key to save and exit the MANU Utility menu.

EDIT/SAVE

⚠ Note

The ESC key can be pressed at any time in the MANU Utility menu to cancel and exit.

Setting FAIL MODE

Background

The FAIL MODE settings only apply to the selected test in AUTO tests.
FAIL MODE has three options, CONTINUE, HOLD and STOP.

When FAIL MODE is set to CONTINUE the tester will continue testing after a FAIL judgment.

When set to HOLD, the tester will hold the test on a FAIL judgment, and then continue testing after the START key is pressed.

The STOP mode will completely stop the test after a FAIL judgment.

⚠ Note

The FAIL MODE setting only applies to AUTO tests. This setting is ignored when running MANU tests.

Steps

1. Press the UTILITY key on the front panel when the tester is in MANU/EDIT status. The display will go from the normal EDIT status to the MANU Utility menu for the current test.

UTILITY

```
MANU=***-002   MANU UTILITY
ARC   MODE:OFF
PASS HOLD:OFF
FAIL MODE:STOP
MAX   HOLD:OFF
GROUND MODE:ON
```

2. Use the UP/DOWN arrow keys to move to the FAIL MODE setting.
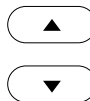
3. Use the scroll wheel to set FAIL MODE.
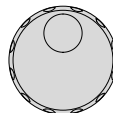
    FAIL MODE   CONTINUE, HOLD, STOP

4. Press the EDIT/SAVE key to save and exit the MANU Utility menu.

    EDIT/SAVE

⚠ Note   The ESC key can be pressed at any time in the MANU Utility menu to cancel and exit.

Setting MAX HOLD

Background   The MAX HOLD setting will hold the maximum current measured in the ACW and DCW tests or the maximum resistance measured in IR and GB tests.

Steps   1. Press the UTILITY key on the front panel when the tester is in EDIT status. The display will go from the normal EDIT status to the MANU Utility menu for *the current test*.

UTILITY

```
MANU=***-002   MANU  UTILITY
ARC    MODE:OFF
PASS  HOLD:OFF
FAIL  MODE:STOP
MAX    HOLD:OFF
GROUND  MODE:ON
```
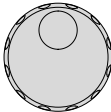
⚠ Note   The MANU UTILITY settings only apply to the selected MANU test.

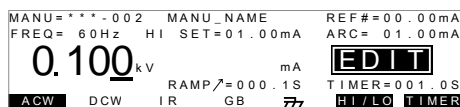2. Use the UP/DOWN arrow keys to move to the MAX HOLD setting.

3. Use the scroll wheel to set MAX HOLD.

   MAX HOLD   OFF, ON

4. Press the EDIT/SAVE key to save and exit the MANU Utility menu.

EDIT/SAVE

⚠️ Note   The ESC key can be pressed at any time in the MANU Utility menu to cancel and exit.

Setting the Grounding Mode

Background   When GROUND MODE is set to ON, the GPT-9000/9000A grounds the return terminal to the ground. This mode is best for DUTs that are grounded to an earth ground by their chassis, fixtures or operation environment. This mode measures the potential of the HIGH VOLTAGE terminal with respect to earth ground. This means that any stray capacitance/resistance that leaks to earth ground will also be measured. This is the safest testing mode, though potentially not as accurate.

When GROUND MODE is set to OFF, the return terminal is floating with respect to the earth ground. This mode is for DUTs that are floating and not directly connected to an earth ground. This is more accurate than when GROUND MODE is set to ON as any stray capacitance/resistance that leaks to the earth

ground from the DUT side of the testing circuit will not be measured. For this reason, this testing mode is able to measure to a higher resolution.

The GROUND MODE is always set to OFF for IR and GB tests.

GROUND MODE = ON, DUT grounded
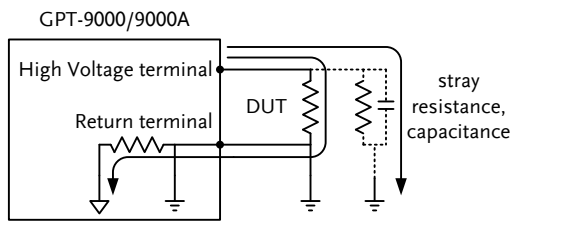
GROUND MODE = ON, DUT floating
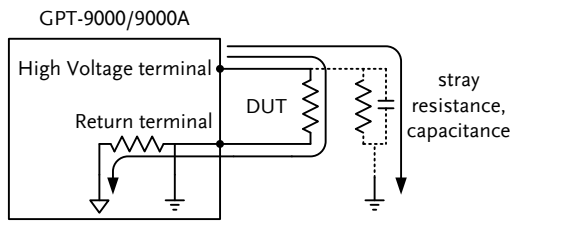
GROUND MODE = OFF, DUT floating

GPT-9000/9000A

GPT-9804/9904 (GB testing)
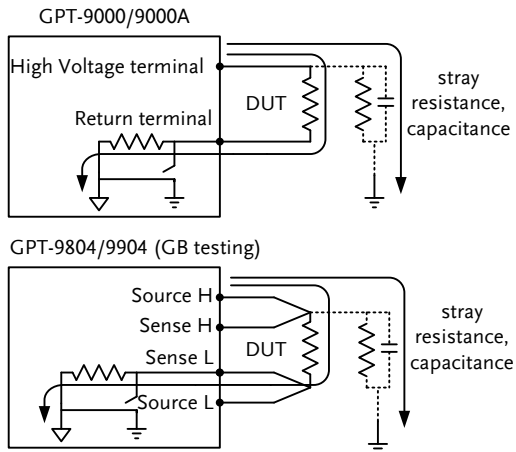
GROUND MODE = OFF, DUT grounded

GPT-9000/9000A

GPT-9804/9904 (GB testing)
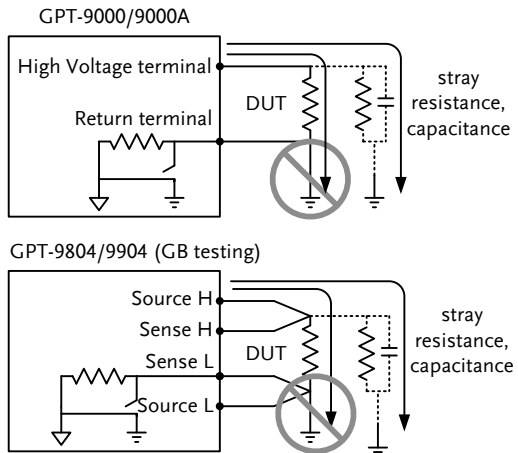
⚠ Warning

When GROUND MODE is set to OFF, the DUT, fixtures or connected instrumentation cannot be grounded. This will short circuit the internal circuitry during a test.

For ACW and DCW tests, if it is not known whether the DUT test setup is grounded or not, always set GROUND MODE to ON.

Only set GROUND MODE to OFF when the DUT is floating electrically.

Steps

1. Press the UTILITY key on the front panel when the tester is in EDIT status. The display will go from the normal EDIT status to the MANU Utility menu for *the current test.*

UTILITY

```
MANU=***-002    MANU UTILITY
ARC   MODE:OFF
PASS  HOLD:OFF
FAIL  MODE:STOP
MAX   HOLD:OFF
GROUND MODE:ON
```
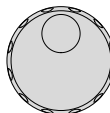
⚠ Note

The MANU UTILITY settings only apply to the selected MANU test.

2. Use the UP/DOWN arrow keys to move the cursor to the GROUND MODE setting.

▲

▼

3. Use the scroll wheel to set the GROUND MODE.
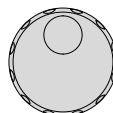
GROUND MODE   OFF, ON

4. Press the EDIT/SAVE key to save and exit the MANU Utility menu.

EDIT/SAVE

5. The GROUND MODE icon on the display
changes accordingly.
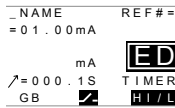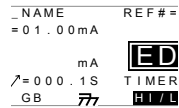
```
_NAME      REF#=           _NAME      REF#=
=01.00mA                   =01.00mA
            mA   ED                    mA   ED
╱=000.1S   TIMER           ╱=000.1S   TIMER
  GB    ◢   HI/L             GB    ╫   HI/L
          ↑                         ↑
     GROUND                    GROUND
   MODE = OFF                 MODE = ON
```

⚠ Note   The ESC key can be pressed at any time in the
              MANU Utility menu to cancel and exit.

              IR and GB tests can only have GROUND MODE
              set to OFF.

Saving and Exiting EDIT Status

Background | After all test parameters have been set, the test can be saved. After a test is saved it can be used when creating an AUTO test.

⚠ Warning | The special MANU number, 000, can be saved, however it cannot be used for AUTO tests. See page 75 for details.

Steps | 1. When in EDIT status, press the EDIT/SAVE key to save the current test. This will enter the VIEW status for the chosen test number.
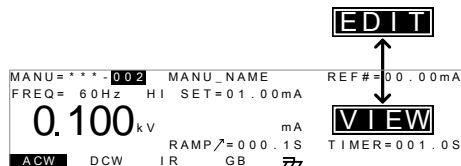
EDIT/SAVE

EDIT

MANU=***-002   MANU_NAME   REF#=00.00mA
FREQ= 60Hz   HI SET=01.00mA
0.100 kV   mA   VIEW
                    RAMP↗=000.1S   TIMER=001.0S
ACW   DCW   IR   GB

2. The Status changes from EDIT to VIEW.

⚠ Note | Pressing the EDIT/SAVE key again will return the tester back to EDIT status for the current test.

Running a MANU Test

Background   A test can be run when the tester is in READY
                      status.

⚠ Note   The tester cannot start to run a test under the
                      following conditions:

                      • A protection setting has been tripped; when a
                        protection setting has been tripped the
                        corresponding error message is displayed on
                        the screen. See page **Error! Bookmark not
                        defined.** for a comprehensive list of the all the
                        setting errors.

                      • The INTERLOCK function is ON and the
                        Interlock key is not inserted in the signal I/O
                        port (page 104).

                      • The STOP signal has been received remotely.

                      If Double Action is ON, ensure the START
                      button is pressed immediately after the STOP
                      button (<0.5s).

⚠ Note   When a test is running the voltage output
                      cannot be changed, unless the test is under the
                      special manual mode. See page 75 for details.

Steps   1. Ensure the tester is in VIEW status   Page 64
                    for the current test. Save the
                    current test if necessary.
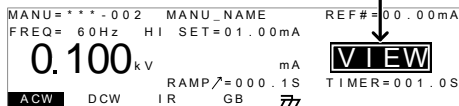
VIEW status

```
MANU=***-002   MANU_NAME      REF#=00.00mA
FREQ= 60Hz   HI SET=01.00mA
  0.100 kV              mA      V I EW
                   RAMP↗=000.1S   TIMER=001.0S
  ACW    DCW    IR    GB    ⏚
```

2. Press the STOP button to put the tester into the READY status.

STOP

READY status

```
MANU=***-002   MANU_NAME      REF#=00.00mA
FREQ= 60Hz   HI SET=01.00mA
  0.100 kV              mA      READY
                   RAMP↗=000.1S   TIMER=001.0S
  ACW    DCW    IR    GB    ⏚
```
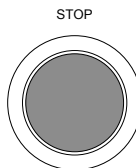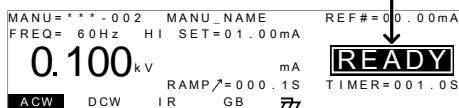
3. The READY indicator will be lit blue when in the READY status.

READY

4. Press the START button when the tester is in the READY status. The manual test starts automatically and the tester goes into the TEST status.
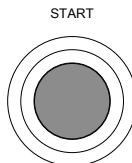
START

5. The TEST indicator will be lit orange when in the TEST status.

TEST

TEST status

```
MANU=***-002   MANU_NAME      REF#=00.00mA
FREQ= 60Hz   HI SET=01.00mA
  0.100 kV  00.00 mA     TEST
                   RAMP↗=000.1S   TIMER=001.0S
  ACW    DCW    IR    GB    ⏚
```
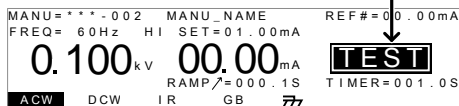
6. The test will start by showing the remaining ramp up time, followed by the remaining test time. The test will continue until the test is finished or the test is stopped.

```
MANU=***-002    MANU_NAME         REF#=00.00mA
FREQ=  60Hz   HI  SET=01.00mA
  0.100kV    00.37mA   ▐TEST▌
                  RAMP↗=000.1S   TIMER=003.2S
  ACW    DCW    IR    GB   ⏚
```

remaining RAMP↗ time

remaining TIMER time

ACW Example

Measured Current

Test Voltage

```
MANU=***-002    MANU_NAME         REF#=00.00mA
FREQ=  60Hz   HI  SET=00.00mA
  0.100kV    00.37mA   ▐TEST▌
                  RAMP↗=000.1S   TIMER=003.2S
  ACW    DCW    IR    GB   ⏚
```

DCW Example

Measured Current

Test Voltage

```
MANU=***-002    MANU_NAME         REF#=00.00mA
              HI  SET=00.00mA
  0.100kV    00.56mA   ▐TEST▌
                  RAMP↗=000.1S   TIMER=003.2S
  ACW    DCW    IR    GB   ⏚
```

IR Example

Measured Resistance

Test Voltage

```
MANU=***-002    MANU_NAME         REF#=  0000MΩ
              HI  SET=  100MΩ
  0.050kV    1056 MΩ   ▐TEST▌
                  RAMP↗=000.1S   TIMER=003.2S
  ACW    DCW    IR    GB   ◿
```

GB Example

Measured Resistance

Test Current

```
MANU=***-002    MANU_NAME        REF#=000.0mΩ
FREQ=  60Hz   HI  SET=300.0mΩ
  03.01 A      200.7 mΩ    TEST
  GBV=0.622V                      TIMER=003.2S
  ACW    DCW     IR      GB
```

Stop the Test

1. To stop the test at any time when it is running, press the STOP button. The test will stop immediately. When the STOP button is pressed, a judgment is not made on the test.
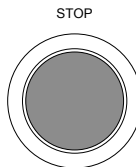
   STOP

   All panel keys except the STOP button are locked when the tester is in STOP status.

   STOP status

```
MANU=***-002    MANU_NAME        REF#=00.00mA
FREQ=  60Hz   HI  SET=01.00mA
  0.100 kV   00.00 mA    STOP
                 RAMP↗=000.1S    TIMER=001.0S
  ACW    DCW     IR      GB
```
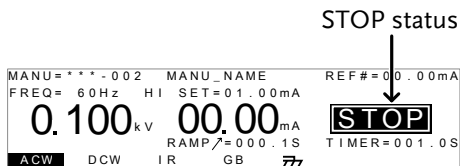
2. To put the tester back into READY status, press the STOP button again.

   STOP
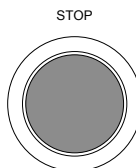
Exit TEST Status

To exit testing, press the MANU/AUTO key when the tester is in the READY status. The tester will revert to the VIEW status for the current test.

MANU/AUTO

```
MANU=***-002   MANU_NAME      REF#=00.00mA
FREQ= 60Hz   HI SET=01.00mA
  0.100 kV                mA     VIEW
                  RAMP↗=000.1S  TIMER=001.0S
 ACW    DCW    IR    GB   ⏚
```

⚠ Note	Do not touch any terminals, test leads or any other connections when the test is on.

PASS / FAIL MANU Test

Background | If the test is allowed to run to completion (the test is not stopped or a protection setting is not tripped) then the tester will judge the test as either PASS or FAIL.

⚠ Note | The test will be judged PASS when:
- The HI SET and LO SET limits have not been tripped during the test time.

The test will be judged FAIL when:
- Either the HI SET or LO SET limit has been tripped during the test time.
- A protection setting has been tripped during the test time. See page 169 for a list of error messages.

PASS Judgment | 1. When the test is judged as PASS, PASS will be displayed, the buzzer will sound and the PASS indicator will be lit green.

PASS

```
MANU=***-002   MANU_NAME        REF#=00.00mA
FREQ= 60Hz    HI SET=01.00mA
  0.100kV  00.37mA   │PASS│
                 RAMP╱=000.1S   TIMER=001.0S
  ACW    DCW    IR     GB    ⊥
```
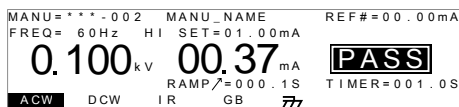
2. The PASS judgment will be held on the display until the STOP or START button is pressed.

Pressing the STOP button will return the tester to the READY status.

STOP
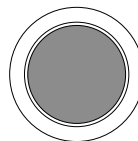
Pressing the START button will
restart the test.
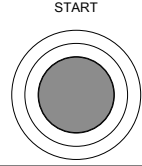
START

⚠ Note

The buzzer will only sound if the Pass Sound is set
to ON. See page 101 for details.

The START button is disabled when the buzzer is
beeping.

PASS Timing
Diagrams

The timing diagrams below show the ACW, DCW,
IR and GB timing for the START status, TEST
status and PASS judgment.

ACW PASS
Timing
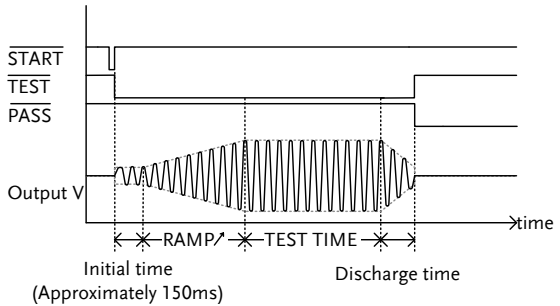
DCW PASS
Timing

IR PASS Timing

START
TEST
PASS

Output V

→time

←—RAMP↗—※—TEST TIME—※→

Initial time   Discharge time
(Approximately 150ms)

GB PASS Timing

START
TEST
PASS

Output I

→time

←RAMP UP—※—Test Time—→
0.1s
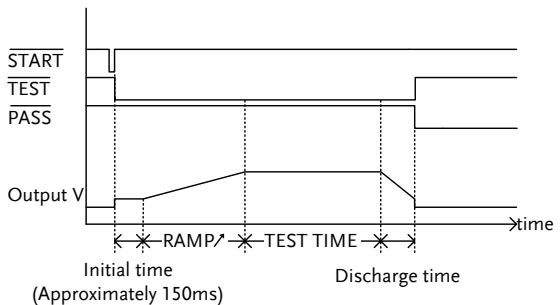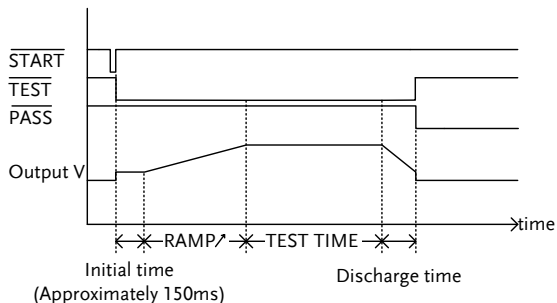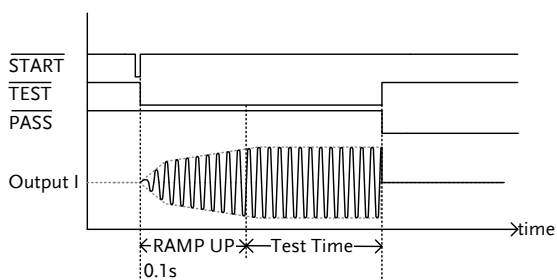
FAIL Judgment   1. When the test is judged as FAIL,   FAIL
                    FAIL will be displayed, the buzzer
                    will sound and the FAIL indicator
                    will be lit red.

                    As soon as a test is judged FAIL,
                    power is cut from the terminals.


```
MANU=***-002   MANU_002        REF#=00.00mA
FREQ= 60Hz   HI SET=01.00mA
  0.100kV  01.37mA   FAIL
                     RAMP↗=000.1S  TIMER=001.0S
  ACW     DCW     IR    GB    ⏚
```
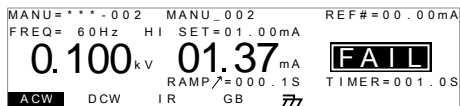
2. The FAIL judgment will be held on   STOP
    the display until the STOP button
    is pressed. Pressing the STOP
    button twice will return the tester
    to the READY status.

3. The READY indicator will be lit
   blue in the READY status.

READY

READY status

```
MANU=***-002   MANU_NAME        REF#=00.00mA
FREQ= 60Hz   HI SET=01.00mA
0.100 kV                      mA     READY
                           RAMP↗=000.1S   TIMER=001.0S
ACW    DCW    IR    GB    ⏚
```
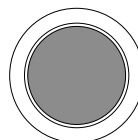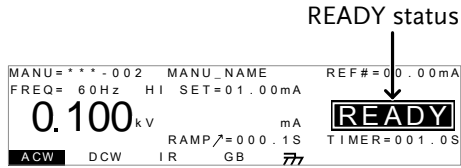
⚠ Note | The buzzer will only sound if Fail Sound is set to ON. See page 101 for details.

FAIL Timing Diagrams | The timing diagrams below show the ACW, DCW, IR and GB timing for the START status, TEST status and FAIL judgment.

ACW FAIL Timing
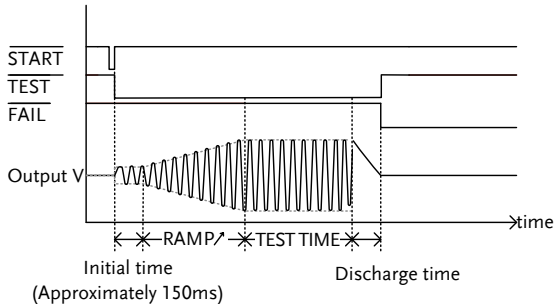
DCW FAIL Timing

IR FAIL Timing

START

TEST

FAIL

Output V

←RAMP↗→←TEST TIME→

time

Initial time
(Approximately 150ms)

Discharge time

GB FAIL Timing

START

TEST

FAIL

Output I

←RAMP UP→←Test Time→
0.1s

time
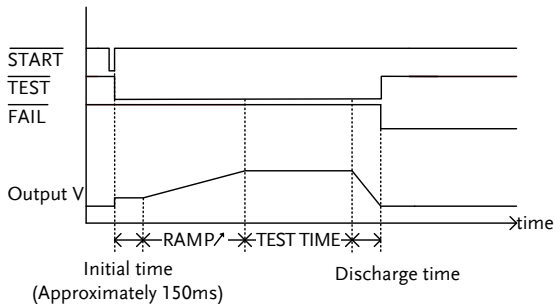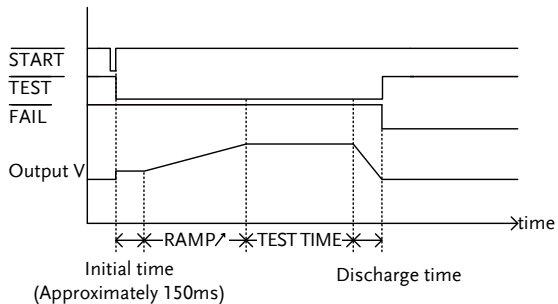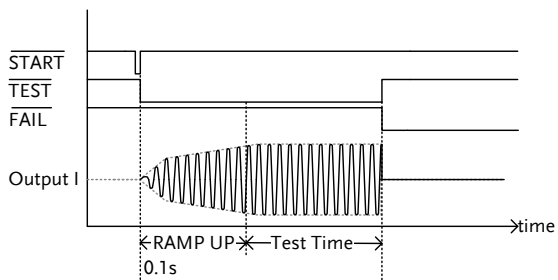
Zeroing of the Test Leads (GB only)

Background   The Zeroing function is used to determine the resistance of the test leads for GB tests. When a zero check is performed, the reference is automatically set to the measured resistance of the test leads.

This function is only available for GB testing.

Steps   1. Ensure the tester is in VIEW status for the current GB test. Save the current test if necessary.

```
MANU=***-002   MANU_NAME      REF#=000.0mΩ
FREQ= 60Hz   HI SET=300.0mΩ
 03.01 A              mΩ  V I E W
 GBV=       V                TIMER=003.2S
 ACW    DCW     IR    GB
```
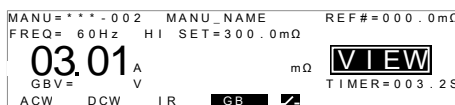
2. Short the positive and negative alligator clips as shown below.
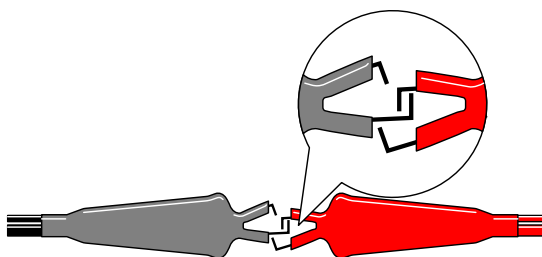
3. Press the STOP button to put the tester into the READY status.

STOP
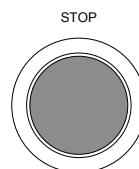
4. The ZERO function can be activated by pressing the corresponding soft-key in the READY status. The ZERO soft-key will be highlighted.

ZERO

5. Press the START button to perform the zero check. The tester will go into the ZERO status.

START

Measured Resistance

ZERO status

```
MANU=***-002    MANU_NAME        REF#=000.0mΩ
FREQ= 60Hz    HI SET=300.0mΩ
  03.01 A      200.7 mΩ    ZERO
  GBV=0.622V                TIMER=003.2S
  ACW    DCW    IR     GB              ZERO
```
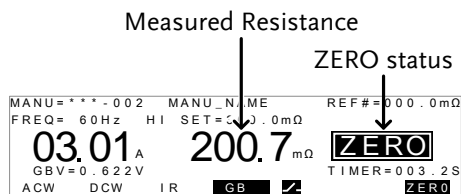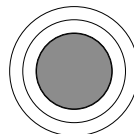
6. When the zero check has finished, the tester will return back to the VIEW status. The resistance of the test leads will be automatically set as the Reference value.

Reference value

```
MANU=***-002    MANU_NAME        REF#=200.7mΩ
FREQ= 60Hz    HI SET=300.0mΩ
  03.01 A              mΩ    VIEW
  GBV=    V                  TIMER=003.2S
  ACW    DCW    IR     GB
```
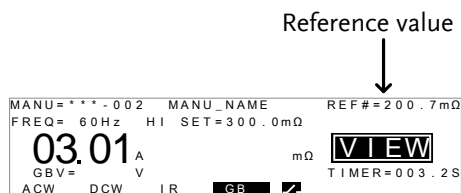
⚠ Note   Remember to replace the test leads to the proper position on the DUT before testing.

I<SET   If SOURCE H/L terminals are open or poorly
                         connected, then an I<SET error will appear on the
                         screen. Stop the test and re-check the connection
                         again and try again.

I<SET error message

FAIL status

```
MANU=***-00    MANU_NAME      REF#=000.0mΩ
FREQ= 60Hz  ↓II SET=300.0mΩ
          I  <  SET                FAIL
GBV=5.622V                    TIMER=003.2S
ACW    DCW     IR    GB   ✎           ZER0
```
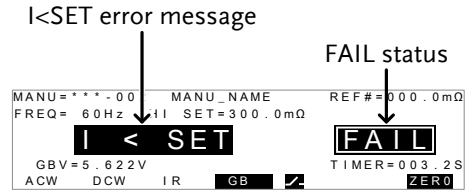
R = 0   Stop the test and perform the zero check again.

R = 0 error message

FAIL status

```
MANU=***-00    MANU_NAME      REF#=000.0mΩ
FREQ= 60Hz  ↓II SET=300.0mΩ
          R  =  0                FAIL
GBV=5.622V                    TIMER=003.2S
ACW    DCW     IR    GB   ✎           ZER0
```
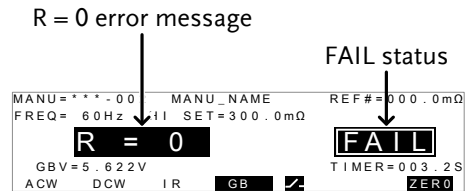
Special MANU Test Mode (000)

Special Test
Mode Overview

When MANU number 000 is selected, the special test mode is activated. Under the special test mode, the voltage can be changed during a test, in real time (ACW, DCW only). The test function can also be changed when in READY or VIEW status, unlike under normal operation.

Separate settings can be saved under the special test mode for each of the testing functions: ACW, DCW, IR and GB. This means a different ACW, DCW, IR and GB test setup can be saved for MANU number 000.

Sweep Function
Overview

The GPT-9901A/9902A/9903/9903A and 9904 have access to the sweep mode function. The sweep function creates a graph of one of the ACW, DCW, IR or GB tests in the special manual mode. The graph will plot the output voltage, current or resistance versus time. After the test has been completed, the test current, voltage or resistance at any point in time can be viewed in the graph.

Below is an example of the resultant sweep plot of a DCW test where a DC voltage is ramped up to a user-defined level until the HI SET current level has been tripped or the test time runs out.

Legend: Voltage: ——— Current – – -
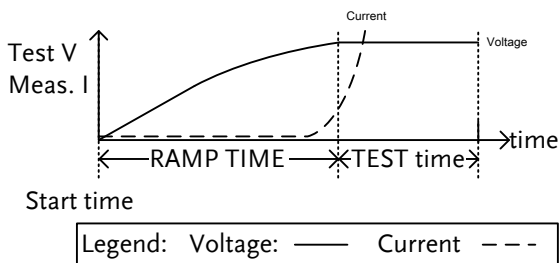
The test items that are plotted on the sweep graph depend on the type of test that is performed.

TEST	Graph Test Items
ACW:	Test voltage, measured current (V, I)
DCW:	Test voltage, measured current (V, I)
IR:	Test voltage, measured resistance (V, R)
GB:	Test current, measured resistance (I, R)

Steps

1. Choose MANU number 000 to enter the special test mode.

   Page 39

2. The settings of a previous test can be loaded by pressing the corresponding soft-key in the VIEW or READY status.

   ACW

   Example: ACW

   For example, if you are currently in DCW mode, pressing the ACW key will load the ACW settings that were previously used in the special manual mode.

3. Set all the necessary parameters for a test and save. Pages 40~64

    Note: A different test setup can be saved for each test function (ACW, DCW, IR and GB).

```
MANU = * * * - 000    MANU_NAME         REF# = 00.00mA
FREQ = 60Hz    HI SET = 01.00mA
  0.100 kV                        mA       V I EW
STA.t = 0000.1S  RAMP↗ = 000.1S   TIMER = 001.0S
 ACW    DCW    IR     GB    ꝛ   SWEEP   STA.t
```
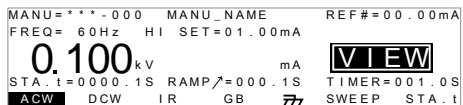
GPT-99XX/99XXA shown.

⚠ Note

The TIMER settings can be set OFF when in the special test mode for ACW and DCW tests.

If the TIMER settings are set to OFF, the sweep function will not produce a graph.

Setting the Sweep Start Time

1. When in the VIEW status, press the STA.t key and set the starting time for the sweep graph. Make sure that the sweep start time is significantly less than the test time. This setting is only applicable for the GPT-9901A/9902A/9903/ 9903A/9904.

STA.t
▭

```
MANU = * * * - 000    MANU_NAME         REF# = 00.00mA
              HI SET = 01.00mA
  0.100 kV                        mA       V I EW
STA.t = 0000.1S  RAMP↗ = 000.1S   TIMER = 001.0S
 ACW    DCW    IR     GB    ꝛ   SWEEP   STA.t
```

↑
Start time
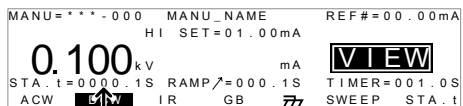
2. Press the EDIT/SAVE key to save the Start time.

EDIT/SAVE
▭

Running the Test	1. In special test mode (000), tests are started and stopped in the same way as for the normal manual test mode. See page 65 for details.	Page 65

2. If required, the scroll wheel can be used to set the voltage level in real-time as the test is running (this does not apply to IR or GB tests).
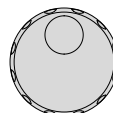
ACW	0.050kV ~ 5kV
DCW	0.050kV ~ 6kV

Results	Test judgments are the same as those for the normal manual tests. Please see the PASS/FAIL MANU Test section for details.	Page 70

View Sweep Graph	Unlike normal manual tests, the special test mode also has an option to view the resultant test as a sweep graph.

This option is only available for the GPT-9901A/9902A/9903/9903A/9904. |

Steps	1. When the test has finished, press the SWEEP key to view the results of the sweep in a graph.

SWEEP

	Graph Test Items:	
TEST	Primary	Secondary
ACW	Test voltage	test current
DCW	Test voltage	test current
IR	Test voltage	test resistance
GB	Test current	test resistance

DCW Example

Primary item   Secondary item

Test Time   STA.t time   Cursor
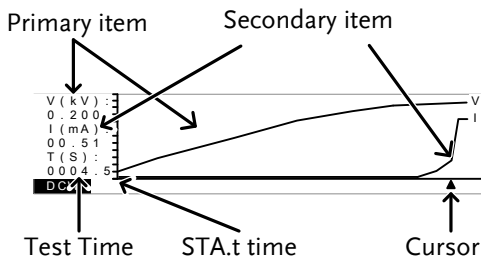
2. Use the scroll wheel to move the cursor on the time axis (x-axis). The measured values for the primary and secondary items at that particular point in time are shown on the left-hand side.
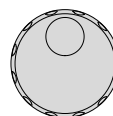
Remove Lines from the Graph

1. Pressing the F5 key will toggle the primary test item on/off.

2. Pressing the F6 key will toggle the secondary test item on/off.
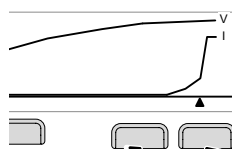
Toggle   Toggle
voltage line   current line
Example: DCW test

Exit the Results Graph

To exit the graph, press the ESC key. You will be returned back to MANU mode/VIEW status.

ESC

Automatic Tests

This section describes how to create, edit and run automatic tests. Automatic tests allow you to link together up to 16 different MANU tests and run them sequentially. Each stored MANU test is used as a test step when creating an AUTO test.

- Choose/Recall an Automatic Test→ from page 83
- Edit Automatic Test Settings → from page 85
- Adding a Step to the Automatic Test → from page 86
- Creating an AUTO Test File Name → from page 87
- Saving and Exiting EDIT Status → from page 88
- Automatic Test Page View → from page 89
- Running an Automatic Test → from page 92
- Automatic Test Results → from page 96

Before operating the GPT-9000/9000A please read the safety precautions as outlined in the Set Up chapter on page 23.

Choose/Recall an Automatic Test

Background   The tester must first be put into AUTO mode to create or run automatic tests.

Up to 100 automatic tests can saved/recalled.

Steps   1. If the tester is in MANU mode, press and hold the MANU/AUTO key for three seconds. This will put the tester into Auto mode.

MANU/AUTO

The tester can only switch between AUTO and MANU mode when in the VIEW status.

MANU=***-001   MANU_NAME   VIEW status

AUTO=001-100 AUTO_NAME   REF#=00.00mA
FREQ= 60Hz   HI SET=01.00mA
0.100kV   mA   **VIEW**
          RAMP↗=000.1S TIMER=001.0S
 ACW DCW IR GB
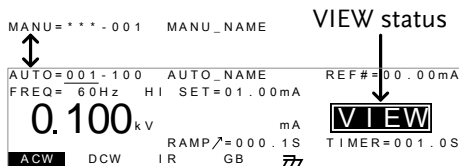
⚠️ Note

If the chosen automatic test has not yet been setup, then the screen will be blank except for the status and mode.

MANU=***-001   MANU_NAME   VIEW status

AUTO=001-*** AUTO_NAME
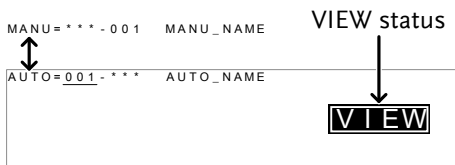
                     VIEW

2. Use the scroll wheel to choose the AUTO number.

AUTO #   001~100

AUTO number

AUTO=001-100 AUTO_NAME   REF#=00.00mA
FREQ= 60Hz   HI SET=01.00mA
0.100kV   mA **VIEW**
        RAMP↗=000.1S TIMER=001.0S
 ACW DCW IR GB
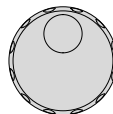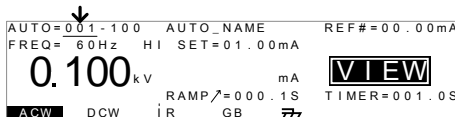
⚠️ Note

The AUTO number can only be chosen in VIEW status. If in the EDIT status, switch to the VIEW status by pressing the EDIT/SAVE or ESC key.

GWINSTEK

Edit Automatic Test Settings

Background

To edit an automatic test, the tester must be in EDIT status.

Any settings or parameters that are edited only apply to the currently selected AUTO number.

Steps

1. Press the EDIT/SAVE key when in VIEW status to enter the EDIT status. This will enter the EDIT status for the chosen AUTO number.

EDIT/SAVE

VIEW

```
AUTO=001-001   AUTO_NAME        REF#=00.00mA
FREQ= 60Hz    HI SET=01.00mA
0.100kV              mA      EDIT
                 RAMP/=000.1S   TIMER=001.0S
 ACW    DCW    IR    GB    ⏚    ADD
```
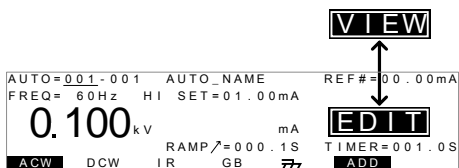
2. The Status changes from VIEW to EDIT. The tester is now ready to edit the current AUTO test.

⚠️ Note

Pressing the EDIT/SAVE key again will save the settings or pressing the ESC will cancel the settings for the current AUTO test and return back to VIEW status.

Adding a Step to the Automatic Test

Background   Up to 16 MANU tests (steps) can be added to
                          an automatic (AUTO) test. Each step is added
                          in a sequential order.

Steps   1. Press the DOWN arrow keys to
                          bring the cursor to the MANU
                          number.

                                    cursor   MANU number

```
AUTO=001-001   MANU_NAME      REF#=00.00mA
FREQ= 60Hz   HI  SET=01.00mA
  0.100 kV                mA      EDIT
                     RAMP↗=000.1S   TIMER=001.0S
  ACW    DCW     IR     GB    ⏚    ADD
```
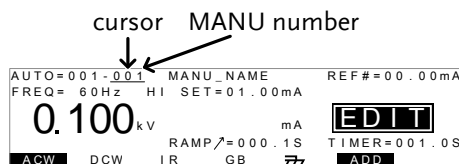
                      2. Use the scroll wheel to choose a
                          MANU number to add to the
                          automatic test.
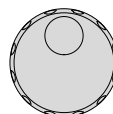
                          MANU number   001~100

                      3. Press the ADD soft-key to add the
                          selected manual test to the
                          automatic test as another step.

                      4. Repeat steps 2 and 3 for any other tests that you
                          wish to add to the automatic test.

⚠ Note   After 16 steps have been added to an AUTO test,
                          FULL will be shown on the display when you
                          attempt to add another step to the AUTO test.

```
AUTO=001-001   MANU_NAME      REF#=00.00mA
FREQ= 60Hz   HI  SET=01.00mA
  0.100 kV                mA      FULL
                     RAMP↗=000.1S   TIMER=001.0S
  ACW    DCW     IR     GB    ⏚    ADD
```
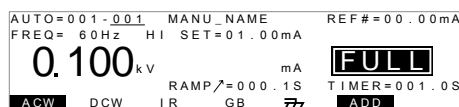
⚠ Note	The test order can be edited in the Page View menu after the AUTO test is saved. See page 89 for details.

Creating an AUTO Test File Name

Background

Each automatic test can have a user-defined test file name (Default: AUTO_NAME) up to 10 characters long. See the character list below for the allowed characters.

Character List

0	1	2	3	4	5	6	7	8	9																	
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	
+	-	*	/	_	=	:	Ω	?	(	)	<	>	[	]												
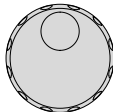
Steps

1. Use the UP/DOWN arrow keys to bring the cursor to the AUTO number. A small cursor will also appear under the first character of the AUTO test file name. This is initially set as <u>A</u>UTO_NAME
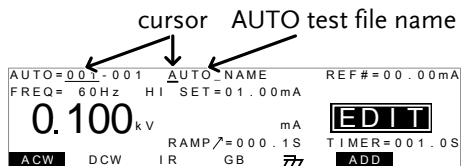
cursor   AUTO test file name

```
AUTO = 0 0 1 - 0 0 1    AUTO_NAME        REF # = 0 0 . 0 0 mA
FREQ =  6 0 H z   H I  S E T = 0 1 . 0 0 mA

  0.100 kV              mA      EDIT
                  RAMP ∕= 0 0 0 . 1 S   TIMER = 0 0 1 . 0 S
  ACW   DCW    I R    G B    ⏚    ADD
```

2. Use the scroll wheel to scroll through the available characters.

3. Press the LEFT/RIGHT arrow keys to go to the next character.

4. The AUTO test file name is set when the current AUTO test is saved or when the cursor is moved to another setting.

⚠Note

To cancel the name changes, press the ESC key before the cursor is moved to another setting or the name is saved.

Saving and Exiting EDIT Status

Background

After all test steps have been added to an automatic test, the automatic test can be saved.

Steps

1. When in EDIT status, press the EDIT/SAVE key to save the automatic test. After the test is saved the tester will revert back to VIEW status.

EDIT/SAVE
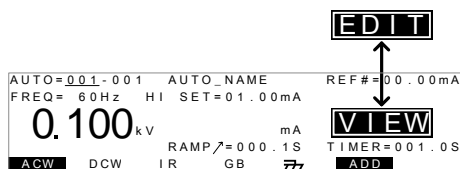
⬭

EDIT

AUTO=001-001   AUTO_NAME   REF#=00.00mA
FREQ= 60Hz   HI SET=01.00mA
0.100kV   mA
                 RAMP↗=000.1S   TIMER=001.0S
ACW   DCW   IR   GB   ⏚   ADD

VIEW

2. The status changes from EDIT to VIEW.

⚠Note

Pressing the EDIT/SAVE key again will return the tester back to EDIT status for the selected AUTO test.

Automatic Test Page View

Background   Pressing the PAGE key will show an overview
                  of the tests for the currently selected automatic
                  test when in the VIEW status. The Page View
                  will show the order of the AUTO test steps as
                  well as the manual file name, function, test
                  voltage/current and HI/LO SET limits.

Steps   1. Ensure the tester has had an   Page 83
                automatic test saved and the tester
                is in AUTO mode/VIEW status.

              AUTO mode   VIEW status
                  ↓   ↓

```
AUTO=001-100    AUTO_NAME        REF#=00.00mA
FREQ=  60Hz   HI  SET=01.00mA
  0.100 kV              mA        VIEW
                  RAMP↗=000.1S    TIMER=001.0S
 ACW    DCW      IR      GB    ⏚
```
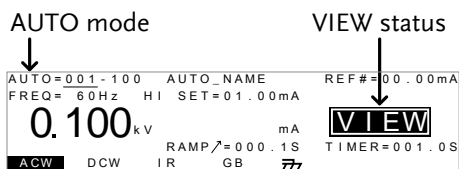
             2. Press the PAGE key to bring up the   (PAGE)
                Page view of the AUTO test.

                All the test steps are shown on the
                bottom of the screen along with the
                corresponding MANU numbers.
                The top of the screen shows the
                selected MANU test file name and
                the settings (test function, test
                voltage, HI/LO SET).

Selected   cursor   AUTO test file name
MANU test
file name

```
AUTO=101-010   AUTO_NAME
MANU NAME   ACW=0.100kV HI_SET=01.00m
#01:010    #02:001    #03:003    #04:00
#05:007    #06:003    #07:038    #08:00
#09:      #10:      #11:      #12:
#13:      #14:      #15:      #16:
MOVE   SWAP   SKIP   DEL
```

Test step →

MANU test for the
corresponding step
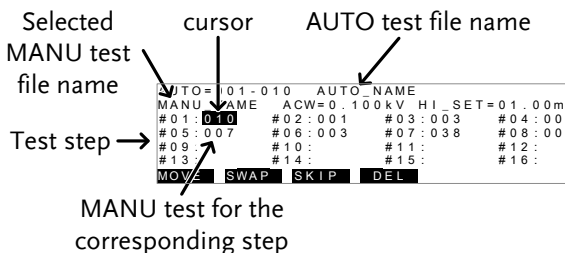
| Editing | When in the Page View, the automatic test steps can be edited. Steps can be deleted, skipped, moved or swapped. |

| Moving a Step | 1. Use the UP/DOWN and LEFT/RIGHT arrow keys to move the cursor to the test step you wish to move. |
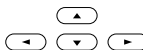
2. Press the MOVE soft-key.

3. Use the UP/DOWN and LEFT/RIGHT arrow keys to move the cursor to the destination step.

4. Press the MOVE soft-key again. The manual test will be moved to the destination step. The remaining steps will move up/down to fill the empty step.

```
AUTO=001-010   AUTO_NAME
MANU_NAME   ACW=0.100kV HI_SET=01.00mA
#01:010 ← #02:001 ← #03:003 ← #04:004
← #05:0   ← #   003    #07:038    #08:005
#09:      #10:      #11:      #12:
#13:      #14:      #15:      #16:
MOVE   SWAP   SKIP   DEL
```

Swapping Two Steps

1. Use the UP/DOWN and LEFT/RIGHT arrow keys to move the cursor to the test step you wish to swap.

2. Press the SWAP soft-key.

   SWAP

3. Use the UP/DOWN and LEFT/RIGHT arrow keys to move the cursor to the second step.
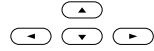
4. Press the SWAP soft-key again. The tests will be swapped with each other.

   SWAP

```
AUTO=001-010   AUTO_NAME
MANU_NAME    ACW=0.100kV HI_SET=01.00mA
#01: 010 ←→ 001    #03:003    #04:004
#05:007    #06:003    #07:038    #08:005
#09:      #10:      #11:      #12:
#13:      #14:      #15:      #16:
MOVE   SWAP   SKIP   DEL
```

Skip a Test Step

1. Use the UP/DOWN and LEFT/RIGHT arrow keys to move the cursor to the test step you wish to skip.
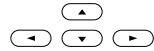
2. Press the SKIP soft-key.

   SKIP

3. The step will have an asterisk beside the MANU number.

```
AUTO=001-010   AUTO_NAME
MANU_NAME    ACW=0.100kV HI_SET=01.00mA
#01: 010*    #02:001    #03:003    #04:004
#05:007    #06:003    #07:038    #08:005
#09:      #10:      #11:      #12:
#13:      #14:      #15:      #16:
MOVE   SWAP   SKIP   DEL
```

⚠️ Note

The next time the automatic test is run, the steps with asterisks will be skipped.

Delete a Test Step 1. Use the UP/DOWN and LEFT/RIGHT arrow keys to move the cursor to the test step you wish to delete.

2. Press the DEL soft-key.

3. The step will be deleted.

Save Changes and Exit

To save the changes made in Page View, press the EDIT/SAVE key. You will be returned back to AUTO mode/VIEW status.

Cancel and Exit Page View

To cancel any changes and to exit the Page View, press the ESC key. You will be returned back to AUTO mode/VIEW status.

Running an Automatic Test

Background

An automatic test can be run when the tester is in READY status.

Note

The tester cannot start to run an AUTO test under the following conditions:

- Any protection modes have been tripped.

- The INTERLOCK function is ON and the Interlock key is not inserted in the signal I/O port (page 114).

- The STOP signal has been received remotely.

  If Double Action is ON, ensure the START

button is pressed immediately after the STOP
button (<0.5s).

⚠ Warning	Do not touch any terminals, test leads or the DUT when a test is running.

Steps

1. Ensure the tester is in VIEW status. Page 83
   Save the automatic test if
   necessary.
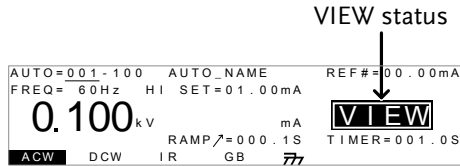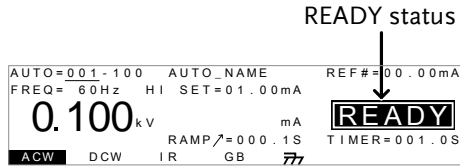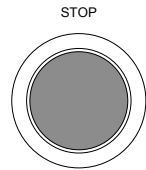
VIEW status

```
AUTO=001-100    AUTO_NAME        REF#=00.00mA
FREQ=  60Hz    HI  SET=01.00mA
  0.100kV                     mA    VIEW
                        RAMP↗=000.1S  TIMER=001.0S
  ACW    DCW    IR    GB    ⏚
```

2. Press the STOP button to put the
   tester into the READY status.

STOP

READY status

```
AUTO=001-100    AUTO_NAME        REF#=00.00mA
FREQ=  60Hz    HI  SET=01.00mA
  0.100kV                     mA    READY
                        RAMP↗=000.1S  TIMER=001.0S
  ACW    DCW    IR    GB    ⏚
```

3. The READY indicator will be lit
   blue when in the READY status.

READY

4. Press the START button when the
   tester is in the READY status. The
   AUTO test starts automatically and
   the display changes to TEST status.
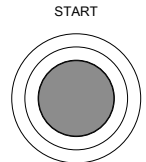
START

5. The TEST indicator will be lit orange when in the TEST status.

TEST

6. Each test will start by showing the remaining ramp up time, followed by the remaining test time. Each test will be tested in sequence until the last test has finished or the test is stopped.

```
AUTO=001-001   AUTO_NAME      REF#=00.00mA
FREQ= 60Hz   HI SET=01.00mA
  0.100 kV    00.37 mA    TEST
                RAMP╱=000.1S   TIMER=003.2S
 ACW    DCW    IR    GB   ⏚
```

remaining RAMP╱ time

remaining TIMER time

PASS/FAIL HOLD 1. If Pass Hold is set to ON or Fail Mode is set to HOLD for a manual test, then the tester will "hold" the testing after a Pass/Fail result for that particular test. See page 55, 57 for details.

HOLD status

```
AUTO=001-001   AUTO_NAME      REF#=00.00mA
FREQ= 60Hz   HI SET=01.00mA
  0.100 kV    00.37 mA    HOLD
                RAMP╱=000.1S   TIMER=003.2S
 ACW    DCW    IR    GB   ⏚
```

2. The PASS or FAIL indicator will also be lit. The buzzer will NOT sound.

PASS

FAIL

3. To continue to the next test after HOLD is displayed on-screen, press the START button.
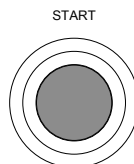
START

4. To stop the test when HOLD is displayed on-screen, press the STOP button.

STOP

⚠️ Note
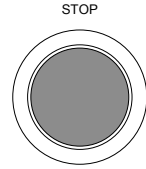
When in HOLD status, only the START and STOP buttons can be pressed, all other keys are disabled.

Stop a Running Test

1. To stop the AUTO test at any time when it is running, press the STOP button. The AUTO test will stop immediately. When the STOP button is pressed, a judgment is not made on the current test and any remaining tests are aborted.
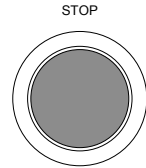
STOP

All panel keys except the STOP and START buttons are locked when the tester has been stopped. All the results up until when the AUTO test was stopped are shown on-screen. See page 96 for more details on automatic test results.

```
AUTO=001-***   AUTO_NAME
#01:FAIL   #02:PASS   #03:STOP   #04:----
#05:----   #06:----   #07:----   #08:----
#09:      #10:      #11:      #12:
#13:      #14:      #15:      #16:
```

Example of an automatic test that has been stopped. Dashes (-) indicate aborted test steps.
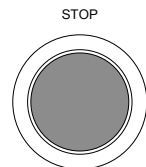
2. To put the tester back into READY status, press the STOP button again.

STOP

Exit Testing

To exit testing, press the MANU/AUTO key when the tester is in the READY status. The tester will revert to the VIEW status for the current automatic test.

MANU/AUTO

```
AUTO=001-100   AUTO_NAME        REF#=00.00mA
FREQ=  60Hz   HI  SET=01.00mA
  0.100kV               mA        VIEW
                  RAMP↗=000.1S    TIMER=001.0S
  ACW    DCW    IR    GB    ⏚
```
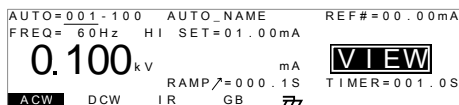
Automatic Test Results

Background

If all the test steps are allowed to run to completion (the AUTO test is not stopped or a protection setting is not tripped) then the tester will judge each step as either PASS or FAIL. This is shown as a table after the automatic test has finished running. If the test has been stopped, then any remaining tests will not be run and thus the AUTO test will not finish running.

Overview

PASS judgment   FAIL judgment

```
AUTO=01-001    AUTO_NAME
#01:PASS    #02:PASS    #03:FAIL    #04:PASS
#05:PASS    #06:SKIP    #07:FAIL    #08:STOP
#09:        #10:        #11:        #12:
#13:        #14:        #15:        #16:
```

skipped step   step stopped

⚠️ Note
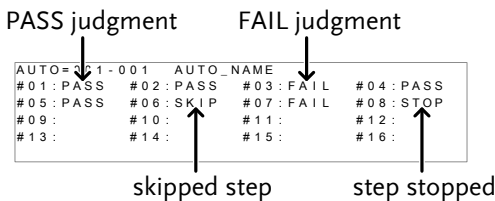
The PASS/FAIL judgment for an automatic test as a whole depends on the results of all the steps (manual tests) that compose the automatic test:

• Each step must be passed for a PASS judgment

(excluding skipped tests).

- A FAIL result for a single step will result in FAIL for the whole automatic test.

- A STOP. No step can be stopped for a PASS/FAIL judgment to be made. In other words, if a test is stopped, it is judged as neither PASS nor FAIL.

- No step can contain an ERROR or ILOCK message.

ERROR message   ILOCK message

```
AUTO = 0 1 - 0 0 1   AUTO_NAME
# 0 1 : E R R O R  # 0 2 : P A S S   # 0 3 : I L O C K
```
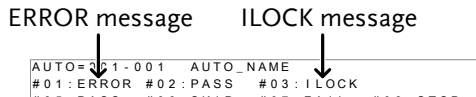
ERROR: Indicates that V, I or R is not correct. This usually occurs if the testing leads are not properly connected.

ILOCK: Indicates that the interlock key is disconnected (if configured to be used).

PASS Judgment

When all the tests have been judged as PASS, the PASS indicator will be lit green and the buzzer will sound.

PASS

```
AUTO = 0 0 1 - * * *   AUTO_NAME
# 0 1 : P A S S   # 0 2 : P A S S   # 0 3 : P A S S   # 0 4 : P A S S
# 0 5 : P A S S   # 0 6 : P A S S   # 0 7 : P A S S   # 0 8 : P A S S
# 0 9 :        # 1 0 :        # 1 1 :        # 1 2 :
# 1 3 :        # 1 4 :        # 1 5 :        # 1 6 :
```

⚠ Note

The Pass Sound setting must to set to ON for the buzzer to sound (page 101).

FAIL Judgment

When any of the tests have been judged as FAIL, the FAIL indicator will be lit red and the buzzer will sound.

FAIL

```
AUTO=001-***   AUTO_NAME
#01:PASS    #02:PASS    #03:PASS    #04:PASS
#05:PASS    #06:FAIL    #07:FAIL    #08:PASS
#09:        #10:        #11:        #12:
#13:        #14:        #15:        #16:
```

⚠ Note

The Fail Sound setting must to set to ON for the buzzer to sound (page 101).

View Results

1. When the PASS or FAIL overview table is shown on the screen, turn the scroll wheel right to scroll through each test step.
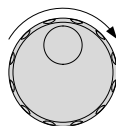
MANU number for current step

step number

```
STEP:  02-003  MANU_NAME        REF#=00.00mA
FREQ=  60Hz   HI SET=01.00mA

 0.100kV    00.37mA   PASS
                RAMP/=000.0S   TIME/=003.2S
 ACW    DCW    IR    GB   ╫
```

PASS/FAIL result

2. Turn the scroll wheel left to return back to the overview table.
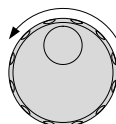
Return to Ready Status

1. The PASS/FAIL results will be held on the screen until the STOP button is pressed.

2. To put the tester back into READY status, press the STOP button (twice for a fail result).
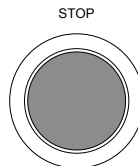
STOP

3. The READY indicator will be lit blue in the READY status.

READY

READY status

```
AUTO=001-100    AUTO_NAME         REF#=00.00mA
FREQ=  60Hz   HI  SET=01.00mA
 0.100 kV                    mA      READY
                       RAMP↗=000.1S   TIMER=001.0S
   ACW    DCW    IR    GB    ⏚
```
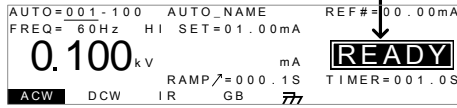
Exit Testing

To exit testing, press the MANU/AUTO key when the tester is in the READY status. The tester will revert to the VIEW status.

MANU/AUTO

```
AUTO=001-100    AUTO_NAME         REF#=00.00mA
FREQ=  60Hz   HI  SET=01.00mA
 0.100 kV                    mA      VIEW
                       RAMP↗=000.1S   TIMER=001.0S
   ACW    DCW    IR    GB    ⏚
```
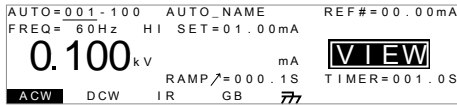
PASS Timing Diagram
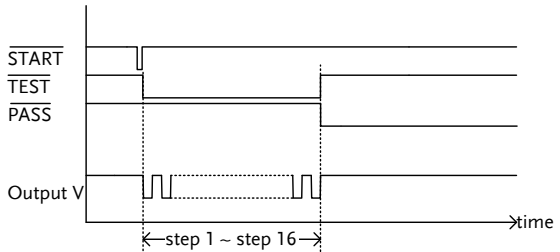
FAIL Timing Diagram
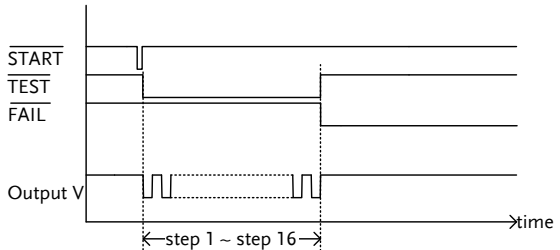
Common Utility Settings

The Common Utility settings are system-wide settings that apply to both MANU tests and AUTO tests.

The Common Utility menu includes the following settings:

- LCD settings → from page 100.
- Buzzer Settings → from page 101.
- Interface Settings → from page 103.
- Control settings → from page 104.
- Control1 settings → from page 107.

LCD Settings

Description   The LCD settings include contrast and brightness controls.

Steps   1. Ensure the tester is in VIEW status. Page 64 Save the current test if necessary.

VIEW status

```
MANU=***-000   MANU_NAME        REF#=00.00mA
FREQ= 60Hz    HI  SET=01.00mA
  0.100 kV                    mA        V I EW
                RAMP/=000.1S   TIMER=001.0S
 ACW    DCW    IR    GB
```
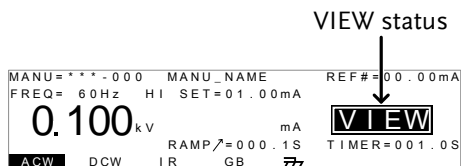
2. Press the UTILITY key.
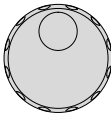
UTILITY

3. Press the LCD soft-key to bring up the LCD Common Utility menu.

LCD

```
 COMMON  UTILITY
LCD Contrast:5
LCD Brightness:BRIGHT

 LCD    BUZZ INTER CTRL
```

4. Use the UP/DOWN arrow keys to choose a menu item: LCD Contrast, LCD Brightness.

▲

▼

5. Use the scroll wheel to select a parameter for the chosen menu item.

   LCD Contrast   1(low) ~ 8(high)
   LCD Brightness   BRIGHT, DARK

6. Press EDIT/SAVE to save the settings and exit to VIEW status.

EDIT/SAVE

⚠ Note

The ESC key can be pressed at any time to cancel and exit back to VIEW status.

Buzzer Settings

Description   The Buzzer settings allow you to set whether the buzzer will sound for PASS/FAIL judgments. The buzzer time can also be set for the PASS/FAIL judgments. The buzzer settings are system-wide.

Steps   1. Ensure the tester is in VIEW status.   Page 64
                   Save the current test if necessary.

VIEW status

```
MANU=***-000    MANU_NAME        REF#=00.00mA
FREQ=  60Hz   HI  SET=01.00mA
  0.100kV              mA      VIEW
               RAMP↗=000.1S    TIMER=001.0S
  ACW    DCW     IR    GB    ⏦
```
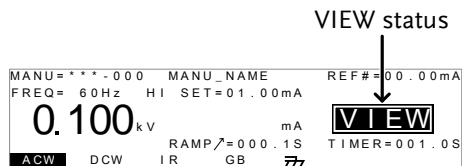
2. Press the UTILITY key.

UTILITY

3. Press the BUZZ soft-key to bring up the Buzzer Common Utility menu.

BUZZ

```
  COMMON  UTILITY
Pass Sound:ON        TIME:000.5 S
Fail Sound:OFF

  LCD    BUZZ  INTER CTRL
```

4. Use the UP/DOWN arrow keys to choose a menu item: Pass Sound or Fail Sound.

▲

▼

5. Use the scroll wheel to select a parameter for the chosen menu item.
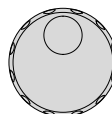
Pass Sound	ON (000.2s~999.9s), OFF
Fail Sound	ON (000.2s~999.9s), OFF

6. Press EDIT/SAVE to save the settings and exit to the VIEW status.

EDIT/SAVE

⚠ Note

When in automatic tests, the Pass Sound and Fail Sound settings only apply to the overall PASS/FAIL of the *overall automatic test*, not each test step that make up the automatic tests.

⚠ Note	The ESC key can be pressed at any time to cancel and exit back to VIEW status.

Interface Settings

Description	The interface settings choose the remote interface configuration. USB, RS232 and GPIB (optional) can be selected.

Steps	1. Ensure the tester is in VIEW status. Page 64 Save the current test if necessary.

VIEW status

```
MANU=***-000    MANU_NAME        REF#=00.00mA
FREQ=  60Hz   HI  SET=01.00mA
    0.100kV                     mA      VIEW
                    RAMP↗=000.1S   TIMER=001.0S
  ACW    DCW    IR     GB    ⏚
```
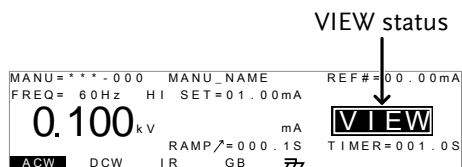
2. Press the UTILITY key.

UTILITY

3. Press the INTER soft-key to bring up the Interface Common Utility menu.

INTER

```
      COMMON  UTILITY
Interface:RS232
Baud:  115200

  LCD    BUZZ  INTER  CTRL
```

4. Use the scroll wheel to select USB, RS232 or GPIB.
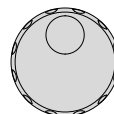
5. For RS232 or GPIB, use the UP/DOWN arrow keys to choose Baud or Address.

▲

▼

6. Use the scroll wheel to select the baud rate or GPIB address.
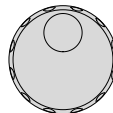
| Baud | 9600, 19200, 38400, 57600, 115200 |
| GPIB address | 0~30 |

7. Press EDIT/SAVE to save the settings and exit to VIEW status.

EDIT/SAVE

⚠ Note   Ensure the baud rate settings or GPIB address matches the host machine.

⚠ Note   The ESC key can be pressed at any time to cancel and exit back to VIEW status.

Control Settings

Description   The Control settings are accessed in the COMMON UTILITY menu. The Control settings include: Start Control, Double Action, Key Lock and Interlock.

Start Control is used to determine how a test is started. Tests can be started via the front panel (START/STOP buttons), from a remote controller or via the SIGNAL I/O port.

The Double Action function is a safety feature used to prevent accidentally starting a test. Normally to start a test, the START button is pressed when the tester is in the READY status. To start a test when Double Action is ON, the STOP button must first be pressed, followed by the START button within 500ms.

Key Lock disables the front panel keys from changing the test number, mode or testing parameters. Only the Utility menu and any keys required for testing are not disabled.

The Interlock function is a safety feature. The interlock function prevents a test from running, unless the interlock pins on the signal I/O port connector are shorted. The included interlock key can be used for this purpose. See page 114 for details.

Steps
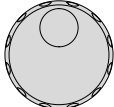
1. Ensure the tester is in VIEW status. Page 64 Save the current test if necessary.

VIEW status

```
MANU=***-000   MANU_NAME      REF#=00.00mA
FREQ= 60Hz  HI SET=01.00mA
 0.100 kV              mA      VIEW
                  RAMP/=000.1S  TIMER=001.0S
 ACW    DCW    IR    GB   ⊥
```
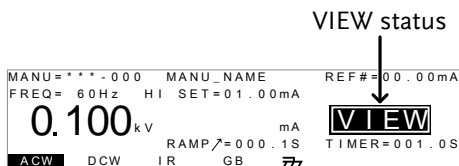
2. Press the UTILITY key.

UTILITY

3. Press the CTRL soft-key to bring up the Control Common Utility menu.

CTRL

```
COMMON UTILITY
Start Ctrl: FRONT PANEL
Double Action:OFF
Key Lock:OFF        INTERLOCK:OFF
 LCD   BUZZ INTER CTRL
```
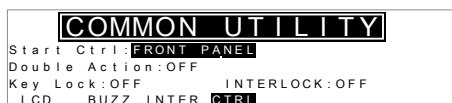
4. Use the UP/DOWN arrow keys to choose a menu item: Start Ctrl, Double Action, Key Lock or INTERLOCK.

5. Use the scroll wheel to select setting for the chosen menu item.

Start Ctrl	FRONT PANEL, REMOTE CONNECT, SIGNAL IO
Double Action	ON, OFF
Key Lock	ON, OFF
INTERLOCK	ON, OFF

6. Press EDIT/SAVE to save the settings and exit to VIEW status.

EDIT/SAVE

⚠ Note The Double Action setting is ignored when the GPT-9000/9000A is being controlled remotely using the USB, RS232 or GPIB interfaces.

⚠ Note If a test is started with INTERLOCK ON, but the interlock signal I/O pins are not shorted (either with the included interlock key or manually), the INTERLOCK OPEN message will be displayed, preventing the test from starting.

Interlock open message

```
MANU=***-002   MANU_NAME      REF#=00.00mA
FREQ= 60Hz   HI SET=1.00mA
                  INTERLOCK OPEN
 0.100 kV              mA        READY
                  RAMP↗=000.1S   TIMER=001.0S
 ACW    DCW    IR    GB   ⏚
```
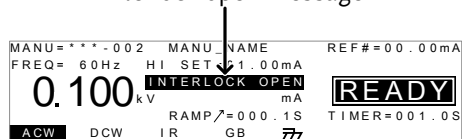
Control1 Settings

Description   The Control1 setting, which is accessed in the
                       COMMON UTILITY menu, currently includes
                       the IR UNIT display function only.

                       The function toggles the IR unit between the
                       default M/G ohm and the fixed G ohm display,
                       which is suitable for applications of high ohm
                       value measurement.

Steps   1.   Ensure the tester is in VIEW status. Page 64
                       Save the current test if necessary.

VIEW status

```
MANU=***-000   MANU_NAME      REF#=00.00mA
FREQ=  60Hz   HI  SET=01.00mA
  0.100 kV             mA      VIEW
               RAMP↗=000.1S    TIMER=001.0S
   ACW    DCW    IR    GB    ⏚
```
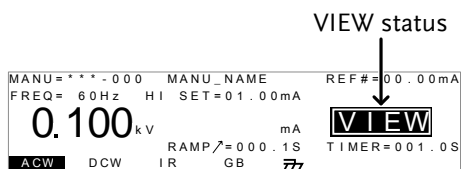
2.   Press the UTILITY key.   UTILITY

3.   Press the CTRL1 soft-key to bring   CTRL1
      up the IR UNIT menu in the
      upper-left corner.

```
     COMMON  UTILITY
IR  UNIT: ON

  LCD    BUZZ  INTER  CTRL    CTRL1  SCAN
```

4.   Use the scroll wheel to select
      setting for the IR UNIT.
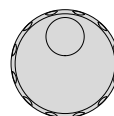
      IR UNIT   ON, OFF

5. Press EDIT/SAVE to save the
    settings and exit to VIEW status.

EDIT/SAVE

⚠ Note

When setting ON, IR unit display is fixed in G ohm
only, whilst OFF indicates IR unit display is shown in
both M and G ohm in accord with measured value.

EXTERNAL CONTROL

The External Control chapter covers the
REMOTE terminal and the SIGNAL I/O port.

External Control Overview

The External Control section describes the front panel REMOTE
terminal connection and the rear panel SIGNAL I/O port.

Remote Terminal Overview

Overview

The REMOTE terminal connector is a standard
5-pin DIN terminal suitable for a remote
controller.

⚠ WARNING

Keep any cables that are connected to the
REMOTE terminal away from the HIGH VOLTAGE
and RETURN terminals.

Pin Assignment
and Connection
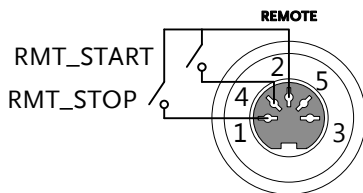
Pin	Pin name	Description
1	RMT_STOP	Remote Stop signal
2	COM	Common line
3	Not used	
4	RMT_START	Remote Start signal
5	Not used	
Signal Properties		
High level input voltage	2.4V~3.3V	
Low level input voltage	0~0.8V	
Input period	minimum of 1ms	

Remote Controller Operation

Description	The GPT-9000/9000A accepts external remote controllers with a START and STOP button. To use the REMOTE terminal, the GPT-9000/9000A must first be configured to accept a remote controller.
	Operating a remote controller is the same as operating the START and STOP buttons on the front panel.

Steps

1. Insert the lead of remote controller into the REMOTE terminal.
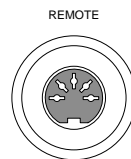
REMOTE

2. Configure the Start Ctrl option to REMOTE CONNECT in the Common Utility menu.

3. The tester will now only be able to start a test using a remote controller.

⚠ NOTE   Even if the GPT-9000/9000A is configured to use the REMOTE CONNECT option, the STOP button on the front panel can still be used to stop a test.

4. To return the operation control to the front panel, configure the Start Ctrl option to FRONT PANEL.

SIGNAL I/O Overview

Overview   The SIGNAL I/O port can be used to remotely start/stop tests and monitor the test status of the instrument. The SIGNAL I/O port is also used for the interlock function (page 104).

The SIGNAL I/O port uses a DB-9 pin female connector.

Pin Assignment
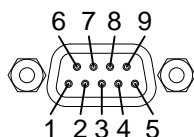
Pin name	Pin	Description
INTERLOCK1	1	When INTERLOCK is ON, a test is only allowed
INTERLOCK2	2	to start when both INTERLOCK pins are shorted.
INPUT_COM	3	Common input line
INPUT_START	4	Start signal input
INPUT_STOP	5	Stop signal input
OUTPUT_TEST	6	Indicates that a test is in progress
OUTPUT_FAIL	7	Indicates that a test has failed
OUTPUT_PASS	8	Indicates that a test has passed
OUTPUT_COM	9	Common output line

Interlock connection
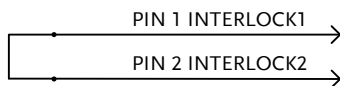
Input Connection

Output
Connection

PIN 6 OUTPUT_TEST

PIN 7 OUTPUT_FAIL

PIN 8 OUTPUT_PASS

PIN 9 OUTPUT_COM
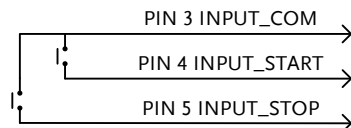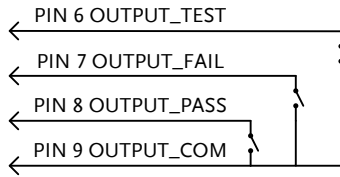
Signal Properties	Input Signals	
	High level input voltage	5V ~ 32V
	Low level input voltage	0V ~ 1V
	Low level input current	Maximum of -5mA
	Input period	Minimum of 1ms
	Output Signals	
	Output Type	Relay form A
	Output Rated Voltage	30VDC
	Maximum output current	0.5A

Input Stop and
Input Start
Timing

INPUT_STOP

INPUT_START
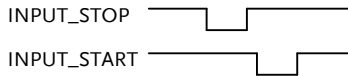
Using the SIGNAL I/O to Start/Stop Tests

Background   To use the SIGNAL I/O port the Start Ctrl
                    settings have to be set to SIGNAL I/O in the
                    Common Utility menu.

Panel operation 1. Set the Start Ctrl option to SIGNAL Page 104
                    I/O.

                 2. Connect the Input/Output signals
                    to the SIGNAL I/O port.

                 3. To start the testing, short the
                    INPUT_STOP and INPUT_COM
                    line for a minimum of 1ms to put
                    the tester into READY status.

                 4. To start the testing, short the
                    INPUT_START and INPUT_COM
                    lines for a minimum of 1ms.

                 5. To stop the testing, temporarily
                    short the INPUT_STOP and
                    INPUT_COM line again.

⚠️ NOTE   Even if the GPT-9000/9000A is configured to use
                    the SIGNAL I/O interface, the STOP button on the
   front panel can still be used to stop a test.

Using the Interlock Key

Background	When the INTERLOCK function is set to ON, tests are only allowed to start when both Interlock pins on the signal I/O port are shorted. Using the Interlock key will short the INTERLOCK1 and INTERLOCK2 pins on the signal I/O port. See page 112 for the Signal I/O pin assignment.

Panel operation   1.   Insert the Interlock key into the SIGNAL I/O port on the rear panel.
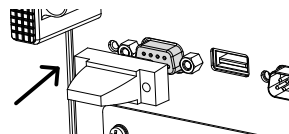
            2.   Set the INTERLOCK option to ON   Page 104
in the Common Utility.

⚠ Note   With INTERLOCK set to ON, the tester can now only start a test when the Interlock key is connected. Do not remove the interlock after starting a test. It must be connected after a test has started or is running.

            Set INTERLOCK to OFF to disable this feature.

REMOTE CONTROL

This chapter describes basic configuration of IEEE488.2 based remote control. The remote interface supports USB, RS232 and GPIB.

Interface Configuration

USB Remote Interface

USB Configuration	PC side connector	Type A, host
	GPT-9XXX side connector	Rear panel Type A
	USB Class	CDC (communications device class) (VCP, Virtual Com Port)

Panel operation	1. Connect the USB cable to the rear panel USB A port.	
	2. Set the interface to USB from the Common Utility menu.	Page 103

⚠ Note	When USB is used for remote control, an RS232 port is simulated. Check the Windows Device Manager for the baud rate and other RS232 settings. Check the RS232 configuration below for more details.
	Note the baud rate is fixed to 115200 baud when using the USB interface.
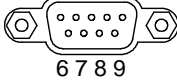
RS232 Remote Interface

RS232 Configuration	Connection	Null modem cable
	Baud rate	9600, 19200, 38400, 57600, 115200
	Parity	None
	Data bits	8

	Stop bit	1
	Flow control	None
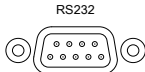
Pin Assignment	1 2 3 4 5 6 7 8 9	1: No connection 2: RxD (Receive Data) 3: TxD (Transmit Data) 4: No connection 5: GND 6-9: No connection

Connection	PC		Tester	
	DB9 Pin	Signal	Signal	DB9Pin
	2	RxD	TxD	3
	3	TxD	RxD	2
	5	GND	GND	5

Panel operation	1. Connect the Null modem cable to the rear panel RS232 port.	RS232

                2. Set the interface to RS232 from the Common Utility menu.

GPIB Remote Interface

GPIB Configuration	Address	0-30

Panel operation	1. Connect the GPIB cable to the rear panel GPIB port.	GPIB

                2. Set the interface to GPIB and set the GPIB address from the Common Utility menu.

USB/RS232 Remote Control Function Check

Functionality check	Invoke a terminal application such as Hyper Terminal.
	To check the COM port number and other settings, see the Device Manager in the PC. For WinXP; Control panel → System → Hardware tab.

Run this query command via the terminal after the instrument has been configured for USB or RS232 remote control (page 117, 117).

*idn?

This should return the Model number, Serial number, and Firmware version in the following format:

GPT-9803, XXXXXXXXXXXX, V1.00

    Model number : GPT-9803
    Serial number :12 character serial number
    Firmware version : V1.00

- ^j can be used as the terminal character when entering the queries/commands from a terminal application.

Display

When the panel is being remotely controlled via the USB, RS232 or GPIB interfaces, RMT will be displayed on the screen.

```
MANU=***-002   MANU_002        REF#=00.00mA
FREQ= 60Hz   HI SET=01.00mA
 0.100 kV              mA   RMT
              RAMP↗=000.1S  TIMER=003.2S
 ACW    DCW    IR    GB   ⊥
```
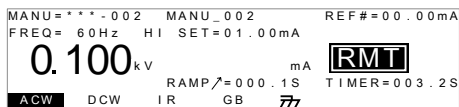
Return to Panel Control

Background

When the instrument is remotely controlled all panel keys except the STOP button are disabled.

Steps

1. When RMT is on the display, press the STOP button. The panel goes to the READY status.

   STOP
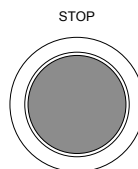
2. From the READY status the tester can go into one of two states: TEST or VIEW.

- To put the tester into VIEW status, press the MANU/AUTO key.

  MANU/AUTO

- To put the tester in TEST status, press the START button. This will start the manual test/automatic test. For more details on running a manual test or automatic test, see pages 65 and 92, respectively.

  START
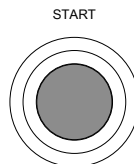
⚠ Note

To put the tester back to RMT, simply issue another remote control command.

Command Syntax

Compatible Standard	IEEE488.2	Partial compatibility
	SCPI, 1999	Partial compatibility

Command Structure

SCPI commands follow a tree-like structure, organized into nodes. Each level of the command tree is a node. Each keyword in an SCPI command represents each node in the command tree. Each keyword (node) of an SCPI command is separated by a colon (:).

For example, the diagram below shows an SCPI sub-structure and a command example.

```
        MANU           MANU:ACW:VOLTage
          |
         ACW
    _____|_____
VOLTage  CHISet   CLOSet
```
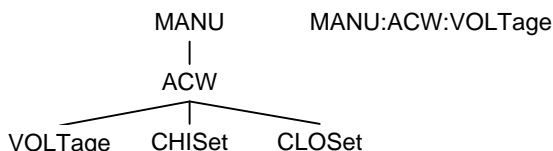
Command types

There are a number of different instrument commands and queries. A command sends instructions or data to the unit and a query receives data or status information from the unit.

Command types

Setting	A single or compound command with/without a parameter
Example	MANU:STEP 1

Query	A query is a simple or compound command followed by a question mark (?). A parameter (data) is returned.
Example	MANU:ACW:VOLTage?

Command Forms	Commands and queries have two different forms, long and short. The command syntax is written with the short form of the command in capitals and the remainder (long form) in lower case.

The commands can be written in capitals or lower-case, just so long as the short or long forms are complete. An incomplete command will not be recognized.

Below are examples of correctly written commands.

Long form	SYSTem:BUZZer:KEYSound SYSTEM:BUZZER:KEYSOUND system:buzzer:keysound
Short form	SYST:BUZZ:KEYS syst:buzz:keys

Command Format	MANU:STEP 100	1. Command header 2. Space 3. Parameter
	1 2 3	
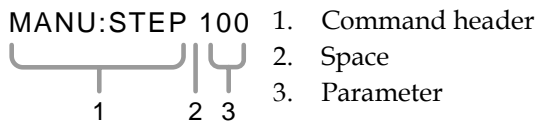
Parameters

Type	Description	Example
<Boolean>	Boolean logic	0, 1
<NR1>	integers	0, 1, 2, 3
<NR2>	decimal numbers	0.1, 3.14, 8.5

	<NR3>	floating point	4.5e-1, 8.25e+1
	<NRf>	any of NR1, 2, 3	1, 1.5, 4.5e-1
	<string>	ASCII text string	TEST_NAME
Message Terminator	CR, LF	Carriage Return, Line feed code	

Command List

System Commands

SYSTem:LCD:CONTrast

Set ⟶

⟶ Query

Description	Sets the contrast of the LCD display from 1 (low) to 8 (bright).
Syntax	SYSTem:LCD:CONTrast <NR1>
Query Syntax	SYSTem:LCD:CONTrast?
Parameter/ Return parameter	<NR1> 1~8
Example	SYST:LCD:CONT 5
	Sets the display contrast to 5.

SYSTem:LCD:BRIGhtness

Set ⟶

⟶ Query

Description	Sets the brightness of the LCD display from 1(dark) to 2(bright).
Syntax	SYSTem:LCD:BRIGhtness <NR1>
Query Syntax	SYSTem:LCD:BRIGhtness?
Parameter/ Return parameter	<NR1> 1 (dark), 2 (bright)
Example	SYST:LCD:BRIG 2
	Sets the display brightness to bright.

SYSTem:BUZZer:PSOUND

Set ⟶

⟶ Query

Description	Turns the buzzer sound on or off for a PASS judgment.
Syntax	SYSTem:BUZZer:PSOUND{ON|OFF}
Query Syntax	SYSTem:BUZZer:PSOUND ?
Parameter/ Return parameter	ON	PASS Sound on.
	OFF	PASS Sound off.
Example	SYST:BUZZ:PSOUND ON
	Turns the buzzer sound on for PASS judgments.

SYSTem:BUZZer:FSOUND

Set ⟶

⟶ Query

Description	Turns the buzzer sound on or off for a FAIL judgment.
Syntax	SYSTem:BUZZer:FSOUND{ON|OFF}
Query Syntax	SYSTem:BUZZer:FSOUND ?
Parameter/ Return parameter	ON	FAIL Sound on.
	OFF	FAIL Sound off.
Example	SYST:BUZZ:FSOUND ON
	Turns the buzzer sound on for FAIL judgments.

SYSTem:BUZZer:PTIMe

Set ⟶

⟶ Query

Description	Sets the PASS sound duration in seconds.
Syntax	SYSTem:BUZZer:PTIMe <NR2>
Query Syntax	SYSTem:BUZZer:PTIMe?
Parameter/ Return parameter	<NR2>	0.2~999.9
Example	SYST:BUZZ:PTIM 1
	Sets the buzzer to 1 second for a PASS judgment.

SYSTem:BUZZer:FTIMe

Set →

→ Query

Description	Sets the FAIL Sound duration in seconds.
Syntax	SYSTem:BUZZer:FTIMe <NR2>
Query Syntax	SYSTem:BUZZer:FTIMe?
Parameter/ Return parameter	<NR2> 0.2~999.9
Example	SYST:BUZZ:FTIM 1
	Sets the buzzer to 1 second for a FAIL judgment.

SYSTem:ERRor

→ Query

Description	Returns any errors in the output buffer. See the error code table below for details.	
Query Syntax	SYSTem:ERRor ?	
Return parameter	<string>	Returns an error string that includes an error code and an error description.

Error Code Table
Error code, Error description
0,No Error
20,Command Error
21,Volume Error
22,String Error
23,Query Error
24,Mode Error
25,Time Error
26,DC Over 50W (GPT-98XX), DC Over 100W (GPT-99XX/99XXA
27,GBV > 5.4V
30,Voltage Setting Error
31,Current Setting Error
32,Current HI SET Error
33,Current LOW SET Error
34,Resistance HI SET Error

35,Resistance LO SET Error
36,REF Setting Error
37,Frequency Setting Error
38,ARC Setting Error
39,RAMP Time Setting Error
40,TEST Time Setting Error
45, Buffer Error
50, Scanner Box Not Found
51, HI Channel Setting Error
52, LO Channel Setting Error
60, Get Data = 0 (GPT-9900 only gets SWEEP data)

Example	SYST:ERR ?
	>0,No Error
	Returns "0,No Error" as the error message.

SYSTem:GPIB:VERSion   →(Query)

Description	Queries the GPIB version.
Query Syntax	SYSTem:GPIB:VERSion?
Return parameter	<string>	Returns: The GPIB version as a string "GPIB,V1.00" or "No GPIB connected" if there is not a GPIB device configured/connected.
Query Example	SYST:GPIB:VERS? >GPIB,V1.00 Returns the GPIB version.

SYSTem:CONTrol:IRUNit

Set →

→ Query

Description	Toggles the IR unit between the default M/G ohm display and the fixed G ohm, which is suitable for applications of high ohm value measurement.
Syntax	SYSTem:CONTrol:IRUNit {ON	OFF}
Query Syntax	SYSTem:CONTrol:IRUNit ?
Parameter/ Return parameter	ON	IR unit fixed in G ohm display.
	OFF	IR unit between M and G ohm displays.
Example	SYST:CONTl:IRUN ON
	Turns the IR unit to G ohm display.

SYSTem:CONTrol:INTerlock

→ Query

Description	Queries the status of Interlock.
Query Syntax	SYSTem:CONTrol:INTerlock?
Return parameter	<string>	Returns: "OFF": Interlock function is off. or "ON" Interlock function is on.
Query Example	SYST:CONT:INT?
	>ON Returns the Interlock function is on.

Function Commands

FUNCtion:TEST

Set →
→ Query
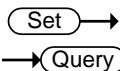
Description	Turns the currently selected test (output) on or off.	
	When HOLD is displayed on the screen during AUTO tests, use the FUNCtion:TEST command to move on to the next step.	
	Setting the FUNCtion:TEST command to OFF at the end of a test will also temporarily turn the PASS/FAIL buzzer sound off.	
Syntax	FUNCtion:TEST {ON|OFF}	
Query Syntax	FUNCtion:TEST?	
Parameter	ON	Turns the test on.
	OFF	Turns the test off.
Return parameter	TEST ON	Test is on.
	TEST OFF	Test is off.
Example	FUNC:TEST ON	
	Turns the output on.	

MEASure<x>   → ⬤ Query

Description	Returns the test parameters & results of the tester in either MANU or AUTO mode.	
	MANU mode: Returns the test parameters & results of a MANU test.	
	AUTO mode: Returns the test parameters & results of the selected step (1-16) of the AUTO test.	
	Return parameters: function, judgment/status, test voltage/current, measured current/resistance, test time (time of completed test) or ramp time (elapsed time of test that has not been completed.	
Query Syntax	MEASure<x>?	
Parameter (MANU mode)		No parameter needed for MANU mode.
Parameter (AUTO mode)	<x>	<NR1>1~16. Step number.
Return parameter	<string>	Returns the test status of the test in the following format: function, judgment or status, test voltage, test current or resistance, test time or ramp time

Function	ACW, DCW, IR, GB
Judgment /Status	PASS, FAIL VIEW
Test voltage	voltage+unit
Test current /Test resistance	current+unit resistance+unit
Test time /Ramp time	T=time+S R=time+S

Example (in MANU mode)	MEAS?
	>ACW,FAIL,0.024kV,0.013 mA ,R=000.1S
	Returns the test result of the current manual test.

Example (in MANU mode)	MEAS? >IR,TEST,0.250kV,----Mohm,T=000.2S
	Returns ---- as the test result when the reading is invalid.
Example (in AUTO mode)	MEAS10? >IR,FAIL,0.250kV,999M ohm,T=010.3S
	Returns step 10 of the current automatic result.

MAIN:FUNCtion

Set ⟶
⟶ Query

Description	Changes the mode between AUTO and MANU.	
Syntax	MAIN:FUNCtion {MANU|AUTO}	
Query Syntax	MAIN:FUNCtion ?	
Parameter	MANU	Puts the tester mode to MANU.
	AUTO	Puts the tester mode to AUTO.
Return parameter	MANU MODE	The tester mode is set to MANU.
	AUTO MODE	The tester mode is set to AUTO.
Example	MAIN:FUNC MANU	
	Sets the tester to MANU mode.	

Manual Commands

MANU:STEP

Set →
→ Query

Description	Sets the MANU test number.
Syntax	MANU:STEP \<NR1>
Query Syntax	MANU:STEP?
Parameter/ Return parameter	\<NR1> 0~100.
Example	MANU:STEP 100
	Sets the manual test number to 100.

MANU:NAME

Set →
→ Query

Description	Sets or returns the test name for the selected manual test. The test must be in MANU mode before this command can be used. Note only alphanumeric characters (A-Z, a-z, 0-9) and the "_" underscore character can be used to set the MANU test name.
Syntax	MANU:NAME \<string>
Query Syntax	MANU:NAME?
Parameter/ Return parameter	\<string> 10 character string. (first character must be a letter)
Example	MANU:NAME test1
	Sets the manual test name to "test1".

MANU:INITial

Set →

Description	Loads the initial (default) settings for the selected MANU test number. The initial settings that are loaded depend on the test function (ACW, DCW, IR or GB).
Syntax	MANU:INITial

Initial Settings		Function			
	Parameter	ACW	DCW	IR	GB
	REF#	0.000mA	0.000mA	0000M Ω	000.0m Ω
	FREQ	60Hz	X	X	60Hz
	HI SET	1.000mA	1.000mA	∞ M Ω	100.0m Ω
	LO SET	0.000mA	0.000mA	0001M Ω	000.0m Ω
	I or V	V=0.100kV	V=0.100kV	V=0.050kV	03.00A
	TIMER	001.0S	001.0S	001.0S	001.0S
	RAMP ↗	000.1S	000.1S	000.1S	X

Example　　　　MANU:INITial

Loads the initial settings for the selected MANU number.

Set ⟶

MANU:RTIMe

⟶ Query
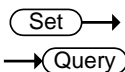
Description	Sets or returns the Ramp Time for the test in seconds. Note: A "TIME ERR" will result if the Ramp Time + Test Time is ≥ 240 seconds when the HI SET limit is over 30mA (GPT-98XX) or over 80mA (GPT-99XX/99XXA). This applies to the ACW function only.
Syntax	MANU:RTIMe <NR2>
Query Syntax	MANU:RTIMe?
Parameter/ Return parameter	<NR2>　　0.1~999.9 seconds
Example	MANU:RTIM 0.5 Sets the ramp time to half a second.

Set ⟶
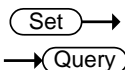
MANU:EDIT:MODE

⟶ Query

Description	Sets or returns the mode (ACW, DCW, IR, GB) of the selected manual test.
Syntax	MANU:EDIT:MODE {ACW|DCW|IR|GB}
Query Syntax	MANU:EDIT:MODE?

Parameter/ Return parameter	ACW	AC Withstand mode
	DCW	DC Withstand mode
	IR	Insulation Resistance mode
	GB	Ground Bond mode

Example	MANU:EDIT:MODE ACW
	Sets the mode to ACW.

Set →

MANU:ACW:VOLTage

→ Query

Description	Sets or returns the ACW voltage in kV. The test must first be in ACW mode before this command can be used.
Syntax	MANU:ACW:VOLTage <NR2>
Query Syntax	MANU:ACW:VOLTage?
Parameter/ Return parameter	<NR2> 0.050 ~ 5.000 (kV)
Example	MANU:ACW:VOLT 1
	Sets the ACW voltage to 1 kV.

MANU:ACW:CHISet

$\boxed{\text{Set}} \longrightarrow$
$\longrightarrow \boxed{\text{Query}}$

Description	Sets or returns the ACW HI SET current value in milliamps. The test must first be in ACW mode before this command can be used.
Syntax	MANU:ACW:CHISet <NR2>
Query Syntax	MANU:ACW:CHISet?
Parameter/ Return parameter	<NR2> 0.001 ~ 042.0 (GPT-98XX) 0.001 ~ 110.0 (GPT-99XX/99XXA)
Example	MANU:ACW:CHIS 10.0
	Sets the ACW HI SET current to 10 mA.

MANU:ACW:CLOSet

$\boxed{\text{Set}} \longrightarrow$
$\longrightarrow \boxed{\text{Query}}$

Description	Sets or returns the ACW LO SET current value in milliamps. The LO SET value must be less than the HI SET value. The test must first be in ACW mode before this command can be used.
	The LO SET range must use the HI SET range. If all the digits in the LO SET range are outside the HI SET range, an error will be produced. All digits outside the HI SET range are ignored and will not be used.
	For example:
	HI SET value: 12.34 LO SET value1: 0.005 → error LO SET value2: 0.053 → no error
	In the example above LO SET value1 will produce an error as all digits are outside the range of HI SET. LO SET value2 will not produce an error, but will return 0.05, not 0.053.

Syntax	MANU:ACW:CLOSet<NR2>
Query Syntax	MANU:ACW:CLOSet?

Parameter/ Return parameter	<NR2>	0.000 ~ 041.9 (GPT-98XX) 0.000 ~ 109.9 (GPT-99XX/99XXA)

Example	MANU:ACW:CLOS 20.0
	Sets the ACW LO SET current to 20 mA.

MANU:ACW:TTIMe

Set →
→ Query

Description	Sets or returns the ACW test time in seconds. The test must first be in ACW mode before this command can be used.
	Note: A "TIME ERR" will result if the Ramp Time + Test Time is ≥ 240 seconds when the HI SET limit is over 30mA (GPT-98XX) or over 80mA (GPT-99XX/99XXA). This applies to the ACW function only.
	In special MANU mode, the TIMER can be turned off.

Syntax	MANU:ACW:TTIMe {<NR2>|OFF}
Query Syntax	MANU:ACW:TTIMe?

Parameter	<NR2> OFF	0.5 ~ 999.9 seconds TIMER OFF (special MANU mode).
Return parameter	<NR2> TIME OFF	0.5 ~ 999.9 seconds TIMER is OFF (special MANU mode).

Example	MANU:ACW:TTIM 1
	Sets the ACW test time to 1 second.

Set →
MANU:ACW:FREQuency
→ Query

Description	Sets or returns the ACW test frequency in Hz. The test must first be in ACW mode before this command can be used.
Syntax	MANU:ACW:FREQuency {50|60}
Query Syntax	MANU:ACW:FREQuency?
Parameter	50 50 Hz
	60 60 Hz
Return parameter	50 Hz 50 Hz
	60 Hz 60 Hz
Example	MANU:ACW:FREQ 50
	Sets the ACW test frequency to 50Hz.

Set →
MANU:ACW:REF
→ Query

Description	Sets or returns the ACW reference value in mA. The test must first be in ACW mode before this command can be used.
	The ACW reference value must be less than the HI SET value.
	The ACW reference value must use the same range as the HI SET value.
Syntax	MANU:ACW:REF <NR2>
Query Syntax	MANU:ACW:REF?
Parameter/	<NR2> 0.000 ~ 041.9 (GPT-98XX)
Return parameter	0.000 ~ 109.9 (GPT-99XX/99XXA)
Example	MANU:ACW:REF 0.01
	Sets the ACW reference to 0.01 mA.

Set →
→ Query

MANU:ACW:ARCCurrent

Description	Sets or returns the ACW ARC current value in mA. ARC must be enabled before the ARC current can be set. The test must first be in ACW mode before this command can be used.
	ARC current uses the same range as the HI SET value. The ARC current is limited to 2X the HI SET value.
Syntax	MANU:ACW:ARCCurrent <NR2>
Query Syntax	MANU:ACW:ARCCurrent?
Parameter/ Return parameter	<NR2> 1.000 ~ 080.0 (GPT-98XX) 2.000 ~ 200.0 (GPT-99XX/99XXA)
Example	MANU:ACW:ARCC 0.04
	Sets the ACW ARC value to 0.04 mA.

Set →
→ Query

MANU:DCW:VOLTage

Description	Sets or returns the DCW voltage in kV. The test must first be in DCW mode before this command can be used.
	Note: A "DC Over 50W" error will result if the DCW Voltage X HI SET value is > 50 watts (GPT-98XX). Note: A "DC Over 100W" error will result if the DCW Voltage X HI SET value is > 100 watts (GPT-99XX/99XXA).
Syntax	MANU:DCW:VOLTage <NR2>
Query Syntax	MANU:DCW:VOLTage?
Parameter/ Return parameter	<NR2> 0.050 ~ 6.100 (kV)
Example	MANU:DCW:VOLT 6
	Sets the DCW voltage to 6 kV.

Set →
→ Query

MANU:DCW:CHISet

Description	Sets or returns the DCW HI SET current value in milliamps. The test must first be in DCW mode before this command can be used.
	Note: A "DC Over 50W" error will result if the DCW Voltage X HI SET value is > 50 watts.
	Note: A "DC Over 100W" error will result if the DCW Voltage X HI SET value is > 100 watts (GPT-99XX/99XXA)
Syntax	MANU:DCW:CHISet <NR2>
Query Syntax	MANU:DCW:CHISet?
Parameter/ Return parameter	<NR2> 0.001 ~ 011.0 (GPT-98XX) 0.001 ~ 021.0 (GPT-99XX/99XXA)
Example	MANU:DCW:CHIS 5
	Sets the DCW HI SET current to 5mA.

Set →
→ Query

MANU:DCW:CLOSet

Description	Sets or returns the DCW LO SET current value in milliamps. The LO SET value must be less than the HI SET value. The test must first be in DCW mode before this command can be used.
	The LO SET range must use the HI SET range. If all the digits in the LO SET range are outside the HI SET range, an error will be produced. All digits outside the HI SET range are ignored and will not be used.
	For example:
	HI SET value: 12.34
	LO SET value1: 0.005 → error
	LO SET value2: 0.053 → no error
	In the example above LO SET value1 will produce

an error as all digits are outside the range of HI SET. LO SET value2 will not produce an error, but will return 0.05, not 0.053.

Syntax	MANU:DCW:CLOSet<NR2>
Query Syntax	MANU:DCW:CLOSet?

Parameter/ Return parameter	<NR2>	0.000 ~ 010.9 (GPT-98XX)
		0.000 ~ 020.9 (GPT-99XX/99XXA)

Example	MANU:DCW:CLOS 2.00
	Sets the DCW LO SET current to 2mA.

MANU:DCW:TTIMe

Set →
→ Query

Description	Sets or returns the DCW test time in seconds. The test must first be in DCW mode before this command can be used.
	In special MANU mode, the TIMER can be turned off.

Syntax	MANU:DCW:TTIMe {<NR2>|OFF}
Query Syntax	MANU:DCW:TTIMe?

Parameter	<NR2>	0.5 ~ 999.9 seconds
	OFF	TIMER OFF (special MANU mode).

Return parameter	<NR2>	0.5 ~ 999.9 seconds
	TIME OFF	TIMER is OFF (special MANU mode).

Example	MANU:DCW:TTIM 1
	Sets the DCW test time to 1 second.

Set →
MANU:DCW:REF   → Query

Description	Sets or returns the DCW reference value in mA. The test must first be in DCW mode before this command can be used.
	The reference value must be less than the HI SET value.
	The reference value uses the same range as the HI SET value.
Syntax	MANU:DCW:REF <NR2>
Query Syntax	MANU:DCW:REF?
Parameter/ Return parameter	<NR2> 0.000 ~ 010.9 (GPT-98XX) 0.000 ~ 020.9 (GPT-99XX/99XXA)
Example	MANU:DCW:REF 0.01
	Sets the DCW reference to 0.01 mA.

Set →
MANU:DCW:ARCCurrent   → Query

Description	Sets or returns the DCW ARC current value in mA. ARC must be enabled to set the ARC current. The test must first be in DCW mode before this command can be used.
	ARC current uses the same range as the HI SET value. The ARC current is limited to 2X the HI SET value.
Syntax	MANU:DCW:ARCCurrent <NR2>
Query Syntax	MANU:DCW:ARCCurrent?
Parameter/ Return parameter	<NR2> 1.000 ~ 20.00 (GPT-98XX) 2.000 ~ 040.0 (GPT-99XX/99XXA)

Example	MANU:DCW:ARCC 10
	Sets the DCW ARC value to 10mA.

MANU:IR:VOLTage

Set →
→ Query

Description	Sets or returns the IR voltage in kV. The test must first be in IR mode before this command can be used.
Syntax	MANU:IR:VOLTage <NR2>
Query Syntax	MANU:IR:VOLTage?
Parameter/ Return parameter	<NR2>	0.05 ~ 1 (0.05kV to 1kV: steps of .05) *GPT-99XX/99XXA also includes a 0.125kV point.
Example	MANU:IR:VOLT 1
	Sets the IR voltage to 1 kV.

MANU:IR:RHISet

Set →
→ Query

Description	Sets or returns the IR HI SET resistance value in MΩ (GPT-98XX) or GΩ. The test must first be in IR mode before this command can be used.
Syntax	MANU:IR:RHISet <NR1>|NULL
Query Syntax	MANU:IR:RHISet?
Parameter/ Return parameter	<NR1>	GPT-98XX only: 2 ~ 9999 (unit = MΩ) GPT-99XX/GPT-99XXA only: Format A: 0.002 ~ 50.00 (unit = GΩ) Format B: 0.002G ~ 50.00G Format C: 2M ~ 50000M
	NULL	Sets the HI SET value to ∞.
Example (GPT-98XX)	MANU:IR:RHIS 10
	Sets the IR HI SET resistance to 10 MΩ.

Example (GPT-99XX/ 99XXA)	MANU:IR:RHIS 0.010
	Sets the IR HI SET resistance to 10 MΩ.

Set →
→ Query

MANU:IR:RLOSet

Description	Sets or returns the IR LO SET resistance value in MΩ (GPT-98XX) or GΩ. The LO SET value must be less than the HI SET value. The test must first be in IR mode before this command can be used.
Syntax	MANU:IR:RLOSet<NR1>
Query Syntax	MANU:IR:RLOSet?
Parameter/ Return parameter	<NR1> GPT-98XX only: 1 ~ 9999 (unit = MΩ) GPT-99XX/GPT-99XXA only: Format A: 0.001 ~ 50.00 (unit = GΩ) Format B: 0.001G ~ 50.00G Format C: 1M ~ 50000M
Example (GPT-98XX)	MANU:IR:RLOS 10
	Sets the IR LO SET resistance to 10MΩ.
Example (GPT-99XX/ 99XXA)	MANU:IR:RLOS 0.010
	Sets the IR LO SET resistance to 10MΩ.

Set →
→ Query
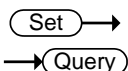
MANU:IR:TTIMe

Description	Sets or returns the IR test time in seconds. The test must first be in IR mode before this command can be used.
Syntax	MANU:IR:TTIMe <NR2>
Query Syntax	MANU:IR:TTIMe?
Parameter/ Return parameter	<NR2> 1.0 ~ 999.9 seconds
Example	MANU:IR:TTIM 1
	Sets the IR test time to 1 second.

MANU:IR:REF

Set →
→ Query

Description	Sets or returns the IR reference value in MΩ (GPT-98XX) or GΩ. The test must first be in IR mode before this command can be used.
	The reference value must be lower than the HI SET value.
Syntax	MANU:IR:REF <NR1>
Query Syntax	MANU:IR:REF?
Parameter/ Return parameter	<NR1> GPT-98XX only: 0000 ~ 9999 (unit = MΩ) GPT-99XX/GPT-99XXA only: Format A: 0 ~ 50.00 (unit = GΩ) Format B: 0G ~ 50.00G Format C: 0M ~ 50000M
Example (GPT-98XX)	MANU:IR:REF 900 Sets the IR reference to 900 MΩ.
Example (GPT-99XX/ 99XXA)	MANU:IR:REF 0.900 Sets the IR reference to 900 MΩ.

MANU:GB:CURRent

Set →
→ Query

Description	Sets or returns the GB current in A. The test must first be in GB mode before this command can be used.
Syntax	MANU:GB:CURRent <NR2>
Query Syntax	MANU:GB:CURRent?
Parameter/ Return parameter	<NR2> 3.00~33.00 (GPT-98XX) 3.00~33.00 (GPT-99XX)
Example	MANU:GB:CURR 3.00 Sets the GB current to 3.00A.

Set →
MANU:GB:RHISet
→ Query

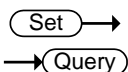|	
Description	Sets or returns the GB HI SET resistance value in mΩ. The test must first be in GB mode before this command can be used.
Syntax	MANU:GB:RHISet <NR2>
Query Syntax	MANU:GB:RHISet?
Parameter/ Return parameter	<NR2> 000.1 ~ 650.0
Example	MANU:GB:RHIS 100.0
	Sets the HI SET value to 100mΩ.

⚠ Note   If the (GB current x HI SET resistance) > 5.4V, then an error will be generated ("GBV > 5.4V").

Set →
MANU:GB:RLOSet
→ Query

|	
Description	Sets or returns the GB LO SET resistance value in mΩ. The LO SET value must be less than the HI SET value. The test must first be in GB mode before this command can be used.
Syntax	MANU:GB:RLOSet<NR2>
Query Syntax	MANU:IR:RLOSet?
Parameter/ Return parameter	<NR2> 0.000 ~ 649.9
Example	MANU:GB:RLOS 50
	Sets the GB LO SET resistance to 50mΩ.

Set →
MANU:GB:TTIMe
→ Query

Description	Sets or returns the GB test time in seconds. The test must first be in GB mode before this command can be used.

Syntax	MANU:GB:TTIMe <NR2>
Query Syntax	MANU:GB:TTIMe?

Parameter/ Return parameter	<NR2>	0.5 ~ 999.9 seconds

Example	MANU:GB:TTIM 1
	Sets the GB test time to 1 second.

Set →
→ Query

MANU:GB:FREQuency

Description	Sets or returns the GB test frequency in Hz. The test must first be in GB mode before this command can be used.

Syntax	MANU:GB:FREQuency {50|60}
Query Syntax	MANU:GB:FREQuency?

Parameter	50	50 Hz
	60	60 Hz
Return parameter	50 Hz	50 Hz
	60 Hz	60 Hz

Example	MANU:GB:FREQ 50
	Sets the GB test frequency to 50Hz.

Set →
→ Query

MANU:GB:REF

Description	Sets or returns the GB reference value in mΩ. The test must first be in GB mode before this command can be used.

Syntax	MANU:GB:REF <NR2>
Query Syntax	MANU:GB:REF?

Parameter/ Return parameter	<NR2>	0.000 ~ 649.9

Example	MANU:GB:REF 100
	Sets the GB reference to 100 mΩ.

Set →
→ Query

MANU:GB:ZEROCHECK

Description	Performs the zero check function. The test must first be in GB mode and in the Ready Status before this command can be used.
	See page 75 for details on the ZERO function.
Syntax	MANU:GB:ZEROCHECK {ON|OFF}
Query Syntax	MANU:GB:ZEROCHECK?
Parameter/ Return parameter	ON Zero function is active. OFF Zero function is not active.
Example	MANU:GB:ZEROCHECK OFF
	Activates the ZERO function.

Set →
→ Query

MANU:UTILity:ARCMode

Description	Sets or returns the ARC mode status for the current test. The ARC mode cannot be set for the IR and GB function.	
Syntax	MANU:UTILity:ARCMode {OFF|ON_CONT| ON_STOP}	
Query Syntax	MANU:UTILity:ARCMode?	
Parameter	OFF	Turns ARC mode off.
	ON_CONT	Sets ARC mode to ON and CONTINUE.
	ON_STOP	Sets ARC mode to ON and STOP.
Return parameter	ARC OFF	ARC mode is set off.
	ARC ON_CONT	ARC mode is set ON and CONTINUE.
	ARC ON_STOP	ARC mode is set ON and STOP.
Example	MANU:UTIL:ARCM OFF	
	Turns ARC mode OFF.	

Set →
→ Query

MANU:UTILity:PASShold

Description	Sets or returns the PASS HOLD setting for the current test.
Syntax	MANU:UTILity:PASShold {ON|OFF}
Query Syntax	MANU:UTILity:PASShold?
Parameter/	OFF	Turns PASS HOLD off.
Return parameter	ON	Turns PASS HOLD on.
Example	MANU:UTIL:PASS OFF
	Turns PASS HOLD OFF.

Set →
→ Query

MANU:UTILity:FAILmode

Description	Sets or returns the FAIL mode setting for the current test.
Syntax	MANU:UTILity:FAILmode {CONT|HOLD|STOP}
Query Syntax	MANU:UTILity:FAILmode?
Parameter/	CONT	Sets/returns the fail mode as continue.
Return parameter	HOLD	Sets/returns the fail mode as hold.
	STOP	Sets/returns the fail mode as stop.
Example	MANU:UTIL:FAIL CONT
	Sets the fail mode to CONT (continue).

Set →
→ Query

MANU:UTILity:MAXHold

Description	Sets or returns the MAX HOLD setting for the current test.
Syntax	MANU:UTILity:MAXHold {ON|OFF}
Query Syntax	MANU:UTILity:MAXHold?
Parameter/	OFF	Turns MAX HOLD off.
Return parameter	ON	Turns MAX HOLD on.

Example   MANU:UTIL:MAXH ON

                 Turns MAX HOLD on.

MANU:UTILity:GROUNDMODE

Set →

→ Query

Description	Sets or returns the Grounding mode of the current test.
	The Ground Mode setting cannot be turned on with the IR and GB function.
Syntax	MANU:UTILity:GROUNDMODE {ON|OFF}
Query Syntax	MANU:UTILity:GROUNDMODE?
Parameter/	OFF	Turns ground mode off.
Return parameter	ON	Turns ground mode on.
Example	MANU:UTIL:GROUNDMODE ON
	Turns GROUND MODE on.

MANU<x>:EDIT:SHOW

→ Query

Description	Returns the test parameters of a manual test.
Query Syntax	MANU<x>:EDIT:SHOW?
Parameter/	<x>	<NR1> 000~100. Manual test number
Return parameter	<string>	Returns a string in the following format: Test function, test voltage, HI SET value, LO SET value, Ramp time, test time.
Example	MANU1:EDIT:SHOW ?
	> ACW,0.100kV,H=01.00mA,L=00.00mA,R=000.1S, >T=001.0S.
	Returns the test parameters of manual test number 1.

Sweep Commands

SWEEP:DATA:STATus   →(Query)

Description	Returns the sweep mode, the voltage and current settings and the number data points that are used in the last sweep. There can be a maximum of 190 data points, depending on the testing time.
	The data is returned as a string in the following format:
	SWEEP MODE,VSET,ISET,Get Data[#data points].
Query Syntax	SWEEP:DATA:STATus?
Return parameter	<string> SWEEP MODE, VSET+unit, ISET+units, Get Data=number of data points
Example	SWEEP:DATA:STATus?
	>ACW,V=0.108kV,HI=10.96 mA ,Get Data=011

SWEEP<X>:DATA:SHOW
➙ (Query)

Description	Returns the data associated with a sweep graph.
	Data can be returned in one of two ways; either all the data can be returned or only the data at a particular point in time.
	The test points are evenly distributed. There can be up to 190 data points.
	If only the data from a single point is returned then the data is returned in the following format*: DATA POINT, VSET, ISET, TIME, CR+LF
	If the all the data for the all the points is returned then the data is returned in the following format*:
	ACW MODE,CR+LF
	No.,V(kV),I(mA), T(S) ,CR+LF
	001,0.071,0.032,0000.1,CR+LF
	002,0.111,0.047,0000.2,CR+LF
	……………………………………
	013,0.601,0.215,0001.3,CR+LF
	END
	*Where CR+LF is a carriage return and line feed code. Time is in seconds.
Query Syntax	SWEEP<X>:DATA:SHOW?
Parameter	<X> <NR1> 1~190 (single data point) <X> <NR1> 0 (all data points)
Single Data Point Example	SWEEP10:DATA:SHOW?
	> 010,0.106,00.00,0001.0, CR+LF
	Returns the data at point 10, which is at the 1 second time for the sweep test.

All Data Points Example	SWEEP0:DATA:SHOW?
	>ACW MODE,CR+LF
	>No.,V(kV),I(mA), T(S) ,CR+LF
	>001,0.071,0.032,0000.1,CR+LF
	>002,0.111,0.047,0000.2,CR+LF
	>......................................
	>013,0.601,0.215,0001.3,CR+LF
	>END
	This will return all the data from the sweep graph.

SWEEP:GRAPh:SHOW

Set →
→ Query

Description	Turns the sweep graph on or off on the GPT-99XX/99XXA display.
Syntax	SWEEP:GRAPh:SHOW {ON|OFF}
Query Syntax	SWEEP:GRAPh:SHOW?
Parameter/ Return parameter	ON	Turn the sweep graph on.
	OFF	Turn the sweep graph off.
Example	SWEEP:GRAP:SHOW ON
	Displays the sweep graph on the LCD display.

SWEEP :GRAPh:LINE

Set →
→ Query

Description	Sets or returns which lines are shown on the sweep graph.
Syntax	SWEEP:GRAPh:LINE <NR1>
Query Syntax	SWEEP:GRAPh:LINE?

Parameter/	<NR1>	Description
Return parameter	0	Turn all lines off/all lines are off.
	1	Displays the graph line for the primary test item. See page 79 for details. For example: V for ACW, DCW and IR tests, I for GB tests.
	2	Displays the graph line for the secondary test items. For example: I for ACW and DCW tests, R for IR and GB tests.
	3	Turn all lines on/all lines are on.

Example	SWEEP:GRAP:LINE 3
	Turns all the graph lines on.

SWEEP:STARt:TIME

Set →
→ Query

Description	Sets or returns the start time (STA.t) of the sweep graph in milliseconds. This setting will also set what the time will be for the first point for the sweep data that is returned in the SWEEP:DATA:SHOW query.
Syntax	SWEEP:STARt:TIME <NR2>
Query Syntax	SWEEP:STARt:TIME ?
Parameter/ Return parameter	<NR2> 0.1~1999.8 seconds
Example	SWEEP:STARt:TIME 1000.0
	Sets the sweep start time to 1000 seconds.

Auto Commands

AUTO:STEP

Set ⟶
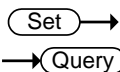
⟶ Query

Description	Sets or queries the AUTO number (automatic test number).
Syntax	AUTO:STEP <NR1>
Query Syntax	AUTO:STEP?
Parameter/ Return parameter	<NR1> 1~100.
Example	AUTO:STEP 100
	Sets the current AUTO number to 100.

AUTO<x>:PAGE:SHOW

→ Query

Description	Returns the Page View of the selected automatic test in the following format:
	step1:MANU number, step2: MANU number, step3….etc.
Query Syntax	AUTO<x>:PAGE:SHOW?
Parameter/	<x> <NR1> 1~100
Example	AUTO1:PAGE:SHOW?

>01:011 ,02:004 ,03:003 ,04:014 ,
>05:015 ,06:020* ,07:012 ,08:018 ,
>09: ,10: ,11: ,12: ,
>13: ,14: ,15: ,16: ,

Shows the Page View for AUTO number 1.

AUTO:PAGE:MOVE

Set →

Description	Moves the source step to the desired destination.
Syntax	AUTO:PAGE:MOVE <Value1>,<Value2>
Parameter/	<Value1> <NR1> 1~16 (source step)
	<Value2> <NR1> 1~16 (destination step)
Example	AUTO:PAGE:MOVE 1, 4

Moves the contents of step 1 to the step 4.

```
AUTO=001-010  AUTO_NAME
MANU_NAME  ACW=0.100kV HI SET=01.50mA
#01:010  #02:001  #03:003  #04:004
#05:007  #06:003  #07:038  #08:005
#09:     #10:     #11:     #12:
#13:     #14:     #15:     #16:
MOVE  SWAP  SKIP  DEL
```

AUTO:PAGE:SWAP   ⟨ Set ⟩⟶

Description	Swaps the source step with destination step.
Syntax	AUTO:PAGE:SWAP <Value1>,<Value2>
Parameter/	<Vaue1> <NR1> 1~16 (source step) <Value2> <NR1> 1~16 (destination step)
Example	AUTO:PAGE:SWAP 1, 4

Swaps the contents of step 1 with step 4.

```
AUTO=001-010   AUTO_NAME
MANU_NAME   ACW=0.100kV HI_SET=01.00mA
#01:010    #02:001    #03:003    #04:004
#05:007    #06:003    #07:038    #08:005
#09:      #10:      #11:      #12:
#13:      #14:      #15:      #16:
MOVE   SWAP   SKIP   DEL
```

AUTO:PAGE:SKIP   ⟨ Set ⟩⟶

Description	Skips the selected step when an AUTO test is run. This is shown as an asterisk (*) when in the PAGE view.
Syntax	AUTO:PAGE:SKIP <NR1>,{ON|OFF}
Parameter/	<NR1> 1~16 (step no.#) ON Skip the selected step. OFF Un-skip the selected step.
Example	AUTO:PAGE:SKIP 1,ON

Skips step number #1.

```
AUTO=001-010   AUTO_NAME
MANU_NAME   ACW=0.100kV HI_SET=01.00mA
#01:010*   #02:001    #03:003    #04:004
#05:007    #06:003    #07:038    #08:005
#09:      #10:      #11:      #12:
#13:      #14:      #15:      #16:
MOVE   SWAP   SKIP   DEL
```

AUTO:PAGE:DEL   ⟨ Set ⟩⟶

Description	Deletes the selected step from the AUTO test. The remaining steps move up to replace the deleted step.
Syntax	AUTO:PAGE:DEL <NR1>
Parameter/	<NR1> 1~16 (step no.#)
Example	AUTO:PAGE:DEL 3
	Deletes the contents of step number #3.

```
AUTO=001-010   AUTO_NAME
MANU_NAME   ACW=0.100kV  HI  SET=01.00mA
#01:010     #02:001     #03:003     #04:004
#05:007     #06:003     #07:038     #08:005
#09:        #10:        #11:        #12:
#13:        #14:        #15:        #16:
MOVE   SWAP   SKIP   DEL
```

AUTO:NAME   ⟨ Set ⟩⟶
⟶⟨ Query ⟩

Description	Sets or returns the AUTO name for the selected automatic test. The test must be in AUTO mode before this command can be used.
	Note only alphanumeric characters (A-Z, a-z, 0-9) and the "_" underscore character can be used to set the AUTO test name.
Syntax	AUTO:NAME <string>
Query Syntax	AUTO:NAME?
Parameter/ Return parameter	<string> 10 character string. (first character must be a letter)
Example	AUTO:NAME program1
	Sets the AUTO name to "program1".

AUTO:EDIT:ADD   ⟨Set⟩ →

Description	Add the selected MANU test to the current AUTO number.
Syntax	AUTO:EDIT:ADD <NR1>
Parameter/	<NR1> 1~100
Example	AUTO:EDIT:ADD 7
	Adds MANU-007 to the current AUTO number. I.e.,

```
AUTO=005-007   AUTO_NAME
MANU_NAME    ACW=0.100kV  HI_SET=01.00mA
#01:010    #02:001    #03:003    #04:004
#05:007    #06:       #07:       #08:
#09:       #10:       #11:       #12:
#13:       #14:       #15:       #16:
MOVE   SWAP   SKIP    DEL
```

MANU test added to
    last step

                                     ⟨Set⟩ →
TESTok:RETurn   → ⟨Query⟩

Description	Allows "OK" to be displayed on the remote terminal when a test has stopped (PASS/FAIL or STOP). This applies for MANU and AUTO mode.
	By default, TESTok:RETurn is set to OFF.
Syntax	TESTok:RETurn {ON|OFF}
Query Syntax	TESTok:RETurn?
Parameter/ Return parameter	ON	Enables the "OK" message to be displayed.
	OFF	Disables the message
Example	TEST:RET OFF
	Disables the message.

*SRE   ➜ Query

Description	AUTO MODE only. Use this command to get measurement step number at the current point in time during AUTO MODE testing.
	Example: User send command "*SRE" to GPT-9000 during AUTO mode
Query Syntax	*SRE?
Return parameter	<NR1> 00~16
Example	*SRE?
	>5
	The current test step is number 5. This indicates that steps 1~4 have already been completed and the results for those steps can now be retrieved.

Common Commands

*CLS

<div align="right">(Set)⟶</div>

Description	The *CLS command clears the internal registers.
Syntax	*CLS

*IDN

<div align="right">⟶(Query)</div>

Description	Queries the model number, serial number, and firmware version of the tester.	
Query Syntax	*IDN?	
Return parameter	<string>	Returns the instrument identification as a string in the following format: GPT-9803, XXXXXXXXXXXX, V1.00 Model number : GPT-9803 Serial number :12 character serial number Firmware version : V1.00

Remote Commands

*RMTOFF   ⟨ Set ⟩⟶

Description	This command can be used to terminate a remote session. When this command is used "RMT" will no longer be displayed on the front panel, indicating that remote mode has been terminated.
Syntax	*RMTOFF

Special Functions

INTerlock:PIN   ⟶⟨ Query ⟩

Description	Queries if the physical interlock pin is shorted or not.	
Query Syntax	INTerlock:PIN?	
Return parameter	<string>	Returns: "PIN OFF": Interlock pin is Not shorted. or "PIN ON" Interlock pin is shorted.
Query Example	INT:PIN?	
	>PIN ON Returns the Interlock pin is shorted.	

F_{AQ}

- The tester will not turn on.
- The panel keys are not working.
- When I press the START button the tester will not start testing?
- The accuracy does not match the specification.

The tester will not turn on.

Ensure the power cord is connected. Ensure the line input is set to the correct line voltage. Check to make sure the fuse is not blown. See page 168.

The panel keys are not working.

Ensure the tester is not in remote mode, page 120.

Ensure the tester is not in SIGNAL I/O or Remote Connect mode, page 104.

When I press the START button the tester will not start testing?

The tester must first be in the READY status before a test can be started. Ensure the tester displays READY before pressing the START button, page 65 (manual test), 92(automatic test).

If "Double Action" is enabled, the START button must be pressed 0.5 seconds after the STOP button is pressed, otherwise the tester will not start testing.

If "Interlock" is enabled, the interlock key must be inserted into the signal I/O port on the rear before a test can be started. See page 114 for details.

Lastly, ensure that the Start Ctrl setting is correctly configured in the Common Utility menu. For example, to enable the START button to start a test, ensure that the Start Ctrl setting is set to FRONT PANEL. See page 104 for details.

The accuracy does not match the specification.

Make sure the tester is powered on for at least 30 minutes, within +15°C~+35°C. This is necessary to stabilize the unit to match the specification.

For more information, contact your local dealer or GWInstek at www.gwinstek.com / marketing@goodwill.com.tw.
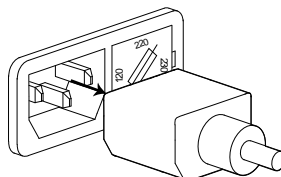
APPENDIX
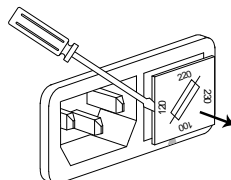
Fuse Replacement

Steps
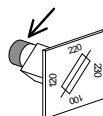
1. Turn the instrument off.
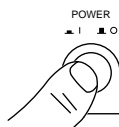
2. Remove the power cord.

3. Remove the fuse socket using a flat screwdriver.
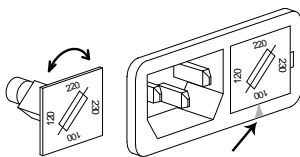

4. Replace the fuse in the fuse holder.

5. Ensure the correct line voltage is lined up with the arrow on the fuse holder. Insert the fuse socket.

Rating	The fuse for the GPT-98XX and the GPT-99XX/99XXA have different ratings:

GPT-98XX:	
100V/120V	T5A 250V
220V/230V	T2.5A 250V

GPT-99XX/99XXA:	
100V/120V	T10A 250V
220V/230V	T6.3A 250V

Error Messages

The following error messages or messages may appear on the GPT screen when configuring parameters or running tests. When status is attributed to Testing, the FAIL indicator on the front pannel of unit will be lit in red.

Error Messages	Status	Description
TIME ERR	Configuring	For ACW tests. GPT-98XX: TIME ERR is displayed when HI SET ≥ 30.00mA~40.00mA and if the RAMP↗ time and the TEST TIME setting is > 240 seconds. GPT-99XX/99XXA: TIME ERR is displayed when HI SET ≥ 80.00mA~100.0mA and if the RAMP↗ time and the TEST TIME setting is > 240 seconds.

OVER 50W (GPT-98XX)	Configuring	For DCW tests. OVER 50W is displayed if the HI SET setting multiplied by the Voltage setting is greater than 50W (GPT-98XX only).
OVER 100W (GPT-99XX/99XXA)	Configuring	For DCW tests. OVER 100W is displayed if the HI SET setting multiplied by the Voltage setting is greater than 100W (GPT-99XX/99XXA only).
I ERR	Testing	For ACW, DCW tests. Shown when the current is set too high.
SHORT [Serr]	Testing	Voltage is too low or there is no High Voltage output. Indicates that the DUT could be shorted.
V ERR	Testing	For ACW, DCW and IR tests. Indicates that an abnormal voltage has been detected.
V = 0	Testing	For GB tests. Voltage is equal to 0. Check to see that the SENSE H is not open.
R ERR	Testing	For IR tests. The voltage is too high or resistance=0Ω. Check to see whether the DUT or test lead is shorting. For GB tests. The resistance is too high.
I<SET	Testing	For GB tests. Current too low. Indicates that the SOURCE L or SOURCE H test lead is open or poorly connected. Test the test lead connection with the DUT to confirm.
I>SET	Testing	For GB tests. Current is too high.
GBV OVER	Configuring	GBV > 5.4V

Factory Default Parameters

LCD	
LCD Contrast	5
LCD Brightness	BRIGHT

BUZZER			
Pass Sound	ON	TIME	000.5s
Pfail Sound	ON	TIME	010.0s

INTER	
Interface	RS232
Baud	9600

CTRL	
Start Ctrl	FRONT PANEL
Double Action	OFF
Key Lock	OFF
INTERLOCK	OFF
	ON
NOTE:	▪ The default "ON" of INTERLOCK applies to FW version after V3.14 for GPT-9800. ▪ The default "ON" of INTERLOCK applies to FW version after V2.12 for GPT-9900.

CTRL1	
IR UNIT	OFF
NOTE:	▪ The IR UNIT option applies to FW version after V2.10 for GPT-9900.

GPT-9000/9000A Specifications

The specifications apply when the GPT-9000/9000A is powered on for at least 30 minutes at 15˚C~35˚C.

Specifications

Environment

Range	Temperature	Humidity
Warranty	15˚C ~ 35˚C	≤70% (No condensation)
Operation	0˚C ~ 40˚C	≤70% (No condensation)
Storage	-10˚C ~ 70˚C	≤85% (No condensation)
Installation Location	Indoors at an amplitude of up to 2000m.	

AC Withstanding Voltage

Output Voltage Range	0.050kV~ 5.000kV[1]
Output Voltage Resolution	2V
Output Voltage Accuracy	$\pm$ (1% of setting +5V) with no load
Maximum Rated Load(Table1)	200 VA (5kV/40mA) [GPT-98XX] 500 VA (5kV/100mA) [GPT-99XX/99XXA]
Maximum Rated Current	40mA [GPT-98XX], 100mA [GPT-99XX/99XXA] 0.001mA ~ 10mA(0.050kV≤V≤0.5kV) 0.001mA ~ 40mA(0.5kV<V≤5kV) [GPT-98XX] 0.001mA ~ 100mA(0.5kV<V≤5kV) [GPT-99XX/99XXA]
Output Voltage Waveform	Sine wave
Frequency	50 Hz / 60 Hz
Voltage Regulation	$\pm$ 1% +5V [Maximum rated load → no load]
Voltmeter Accuracy	$\pm$ (1% of reading+ 5V)
Current Measurement Range	0.001mA~040.0mA [GPT-98XX] 0.001mA~100.0mA [GPT-99XX/GPT-99XXA]

Current Best Resolution	GPT-98XX: 1uA 0.001mA(0.001mA~1.100mA) 0.01mA(01.11mA~11.00mA) 0.1mA(011.1~040.0mA) GPT-99XX/GPT-99XXA: 1uA 0.001mA(0.001mA~1.100mA) 0.01mA(01.11mA~11.00mA) 0.1mA(011.1~100.0mA)
Current Measurement Accuracy	GPT-98XX: Ground mode OFF: ± (1.5% of rdg + 30 counts) when HI SET<1.11mA ± (1.5% of rdg + 3 counts) when HI SET≥1.11mA Ground mode ON: ± (1.5% of rdg + 160 counts) when HI SET<1.11mA ± (1.5% of rdg + 16 counts) when HI SET≥1.11mA ± (1.5% of rdg + 3 counts) when HI SET≥11.1mA GPT-99XX/GPT-99XXA: Ground mode OFF: ± (1.5% of rdg + 30 counts) when HI SET<1.11mA ± (1.5% of rdg + 3 counts) when HI SET≥1.11mA Ground mode ON: ± (1.5% of rdg + 160 counts) when HI SET<1.11mA ± (1.5% of rdg + 16 counts) when HI SET≥1.11mA ± (1.5% of rdg + 3 counts) when HI SET≥11.1mA
Judgment Accuracy	± (3% of setting + 40uA)
Judgment Valid Range (ACW)	HI SET: 0.011mA to 1.100mA 00.11mA to 11.00mA 001.1mA to 040.0mA(GPT-99xx/99xxA is 100.0mA) LOW SET: 0.010mA to 1.099mA 00.10mA to 10.99mA 001.0mA to 039.9mA(GPT-99xx/99xxA is 099.9mA)
Window Comparator Method	Yes
ARC DETECT	Yes
Rise-time Control Function	Yes
RAMP (Ramp Time)	0.1~999.9s
TIMER (Test Time)	OFF[2], 0.5s~999.9s
GND	ON/OFF

[1] At least 0.5 seconds is needed to reach a set voltage of 50V/10mA.
[2] The timer can only be turned off under special MANU mode (MANU=***-000).
[3] When the GND is set to ON, a current flowing into the stray capacity is added for measurement purposes to the current flowing into the DUT, and the current cannot be eliminated. For high sensitivity and high accuracy measurements, it is recommended to set the GND mode OFF.

DC Withstanding Voltage

Output Voltage Range	0.050kV ~ 6.000kV[1]
Output Voltage Resolution	2V
Output Voltage Accuracy	$\pm$ (1% of setting +5V) with no load
Maximum Rated Load(Table1)	50W (5kV/10mA)[GPT-98XX] 100W (5kV/20mA)[GPT-99XX/99XXA]
Maximum Rated Current	10mA [GPT-98XX, 20mA [GPT-99XX/99XXA] 0.001mA ~ 2mA (0.050kV $\leq$V$\leq$0.5kV) 0.001mA ~ 10mA (0.5kV<V$\leq$6kV)[GPT-98XX] 0.001mA ~ 20mA (0.5kV<V$\leq$6kV)[GPT-99XX/ 99XXA]
Voltmeter Accuracy	$\pm$ (1% of reading+ 5V)
Voltage Regulation	$\pm$ 1% +5V [Maximum rated load $\rightarrow$ no load]
Current Measurement Range	0.001mA~010.0mA [GPT-98XX] 0.001mA~020.0mA [GPT-99XX/99XXA]
Current Best Resolution	GPT-98XX: 1uA 0.001mA(0.001mA~1.100mA) 0.01mA(01.11mA~11.00mA) GPT-99XX/99XXA: 1uA 0.001mA(0.001mA~1.100mA) 0.01mA(01.11mA~11.00mA) 0.1mA(011.0mA~020.0mA)

Current Measurement Accuracy	GPT-98XX: Ground mode OFF: ± (1.5% of rdg + 30 counts) when HI SET <1.11mA ± (1.5% of rdg + 3 counts) when HI SET ≥1.11mA Ground mode ON: ± (1.5% of rdg + 180 counts) when HI SET<1.11mA ± (1.5% of rdg + 18 counts) when HI SET≥1.11mA ± (1.5% of rdg + 3 counts) when HI SET≥11.1mA GPT-99XX/99XXA: Ground mode OFF: ± (1.5% of rdg + 30 counts) when HI SET <1.11mA ± (1.5% of rdg + 3 counts) when HI SET ≥1.11mA Ground mode ON: ± (1.5% of rdg + 180 counts) when HI SET<1.11mA ± (1.5% of rdg + 18 counts) when HI SET≥1.11mA ± (1.5% of rdg + 3 counts) when HI SET≥11.1mA
Judgment Accuracy	± (3% of setting + 40uA)
Judgment Valid Range (DCW)	HI SET: 0.011mA to 1.100mA 00.11mA to 10.00mA(GPT-99xx/99xxA 11.00mA) 001.1mA to 020.0mA(GPT-99xx/99xxA only) LOW SET: 0.010mA to 1.099mA 00.10mA to 09.99mA(GPT-99xx/99xxA 10.99mA) 001.0mA to 019.9mA(GPT-99xx/99xxA only)
Window Comparator Method	Yes
ARC DETECT	Yes
Rise-time Control Function	Yes
RAMP (Ramp Time)	0.1~999.9s
TIMER (Test Time)	OFF[2], 0.5s~999.9s
GND	ON/OFF

[1] At least 0 .5 seconds is needed to reach a set voltage of 50V/2mA.
[2] The timer can only be turned off under special MANU mode (MANU=***-000).
[3] When the GND is set to ON, a current flowing into the stray capacity is added for measurement purposes to the current flowing into the DUT, and the current cannot be eliminated. For high sensitivity and high accuracy measurements, it is recommended to set the GND mode OFF.

Insulation Resistance Test

Output Voltage	50V~1000V *GPT-99XX/99XXA also includes a 125V test point.	
Output Voltage Resolution	50V	
Output Voltage Accuracy	(1% of setting+5V) with no load	
Resistance Measurement Range	1MΩ~ 9500MΩ (GPT-98XX) 1MΩ~ 50GΩ (GPT-99XX/99XXA)	

Test Voltage	Measurement Range	Accuracy
(GPT-98XX)		
50V≤V≤450V	1~50MΩ	±(5% of reading +1 count)
	51~2000MΩ	±(10% of reading +1 count)
500V≤V≤1000V	1~500MΩ	±(5% of reading +1 count)
	501~9500MΩ	±(10% of reading +1 count)
(GPT-99XX/ 99XXA)		
50V≤V≤450V	0.001~0.050GΩ	±(5% of reading +1 count)
	0.051~2.000GΩ	±(10% of reading +1 count)
500V≤V≤1000V	0.001~0.500GΩ	±(5% of reading +1 count)
	0.501~9.999GΩ	±(10% of reading +1 count)
	10.00~50.00GΩ	±(20% of reading +1 count)

Test Voltage	Judgment Range	Accuracy
(GPT-98XX)		
50V≤V≤450V	1~50MΩ	±(5% of setting +1 count)
	51~2000MΩ	±(10% of setting +1 count)
500V≤V≤1000V	1~500MΩ	±(5% of setting +1 count)
	501~9500MΩ	±(10% of setting +1 count)
(GPT-99XX/ 99XXA)		
50V≤V≤450V	0.001~0.050GΩ	±(5% of setting +1 count)
	0.051~2.000GΩ	±(10% of setting +1 count)
500V≤V≤1000V	0.001~0.500GΩ	±(5% of setting +1 count)
	0.501~9.999GΩ	±(10% of setting +1 count)
	10.00~50.00GΩ	±(20% of setting +1 count)

Voltmeter Accuracy	±(1% of reading +5V)
Output Impedance	600kΩ
Window Comparator Method	Yes
Rise-time Control Function	Yes
RAMP (Ramp Time)	0.1~999.9s
TIMER (Test Time)	0.5s~999.9s
GND	OFF

Ground Bond Test

Output Current Range	03.00A~30.00A (GPT-98XX) 03.00A~32.00A (GPT-99XX)
Output Current Accuracy	± (1% of setting +0.2A) when 3A≤I≤8A ± (1% of setting +0.05A) when 8A<I≤30A (GPT-98XX) ± (1% of setting +0.05A) when 8A<I≤32A (GPT-99XX)
Output Current Resolution	0.01A
Frequency	50Hz/60Hz selectable
Ohmmeter Measurement Accuracy	± (1% of reading +2mΩ)
Ohmmeter Judgment Accuracy	± (1% of setting +2mΩ)
Ohmmeter Measurement Range	10mΩ~650.0mΩ (depending on output current)

GPT-98XX:
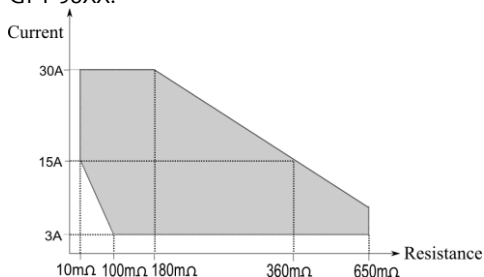
GPT-99XX:
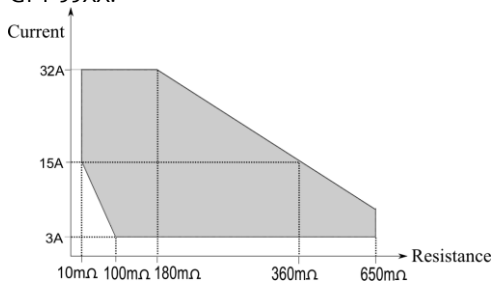
Test Voltage	Max. 6V(AC)open-circuit
Ohmmeter Measurement Resolution	0.1mΩ
Windows Comparator Method	Yes
TIMER (Test Time)	0.5s~999.9s
GND	OFF

Interface

REMOTE (Remote terminal)	Yes
SIGNAL IO	Yes
RS232	Yes
USB (Device)	Yes
GPIB	Yes (OPTION)

General

DISPLAY	240 x 64 dot matrix LED back light LCD
MEMORY	AUTO/MANU mode 100 memory blocks total
POWER SOURCE	AC100V/120V/220V/230V ±10% 50Hz/60Hz Power Consumption: Max. 500VA [GPT-98XX] Max. 1000VA [GPT-99XX]
ACCESSORIES	Power cord x1, Quick Start Guide x1 User Manual x1 (CD) GHT-114x1 for GPT-9801/9802/9803/9901A/ 9902A/9903/9903A GHT-114x1, GTL-215x1 for GTP-9804/9904
DIMENSIONS & WEIGHT	GPT-98XX: Approx. 330(W) x 148(H) x 452(D) mm (Max.), 19kg(Max) GPT-99XX: Approx. 330(W) x 148(H) x 587(D) mm (Max.), 27kg(Max) GPT-99XXA: Approx. 330(W) x 148(H) x 482(D) mm(Max), 24kg(Max)

Table 1a: Output Limitation in Withstanding Voltage Testing (GPT-98XX)

	Upper Current	Pause	Output Time
AC	30mA≤I≤40mA	At least as long as the output time	Maximum 240 seconds
	0.001mA≤I<30 mA	Not necessary	Continuous output possible
DC	0.001mA≤I≤10 mA	Not necessary	Continuous output possible
GB	15A<I≤30A	At least as long as the output time	999.9
	3A≤I≤15A	Not necessary	999.9

NOTE: Output Time = Ramp Time + Test Time.

Table 1b: Output Limitation in Withstanding Voltage Testing (GPT-99XX/99XXA)

	Upper Current	Pause	Output Time
AC	80mA≤I≤100mA	At least as long as the output time	Maximum 240 seconds
	0.001mA≤I<80 mA	Not necessary	Continuous output possible
DC	0.001mA≤I≤20 mA	Not necessary	Continuous output possible
GB	15A<I≤32A (99XX)	At least as long as the output time	999.9
	3A≤I≤15A	Not necessary	999.9

NOTE:
- Output Time = Ramp Time + Test Time.
- TIMER Accuracy: ± (100ppm + 20ms)

Table 1c: GPT-9000 Capacitive Load

	Test Condition			Maximum Capacitive Load
	Test Voltage DCW	HI-SET Current	RAMP Time ↗	
1	1.000kV	I≧1.00mA	T≧1.0s	0.35uF
2	2.000kV	I≧2.00mA	T≧1.0s	0.35uF
3	3.000kV	I≧3.00mA	T≧1.0s	0.35uF
4	4.000kV	I≧3.00mA	T≧1.0s	0.35uF
5	5.000kV	I≧3.00mA	T≧1.0s	0.25uF
6	6.000kV	I≧3.00mA	T≧1.0s	0.125uF

GPT-9801/9802/9803 Dimensions
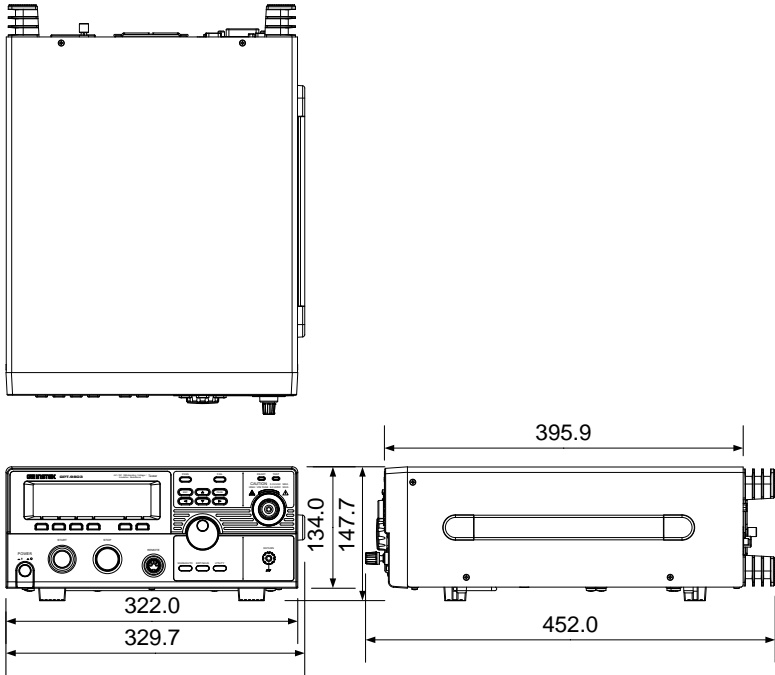
GPT-9804 Dimensions
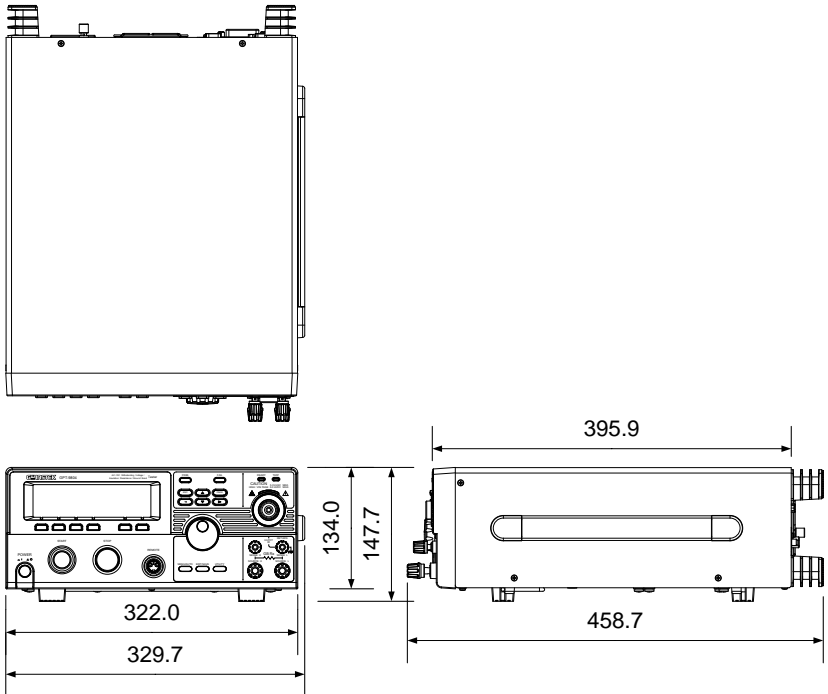
GPT-9903 Dimensions
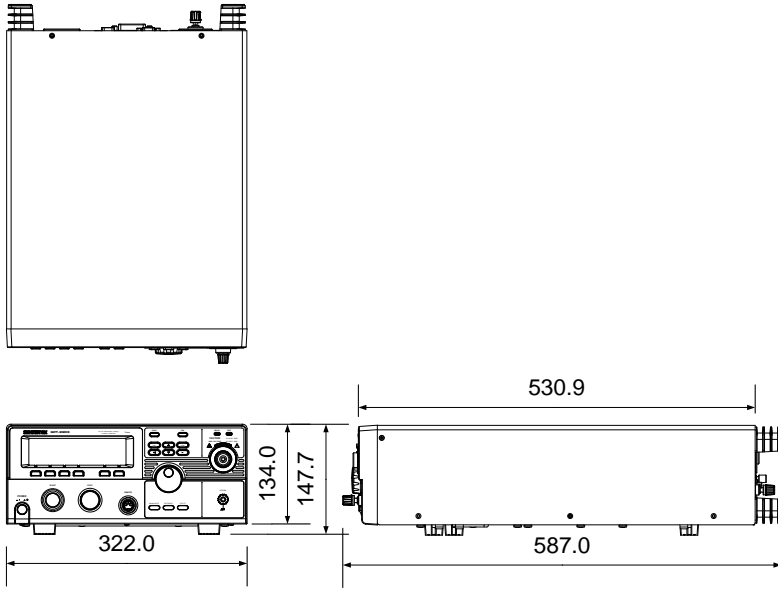
GPT-9904 Dimensions
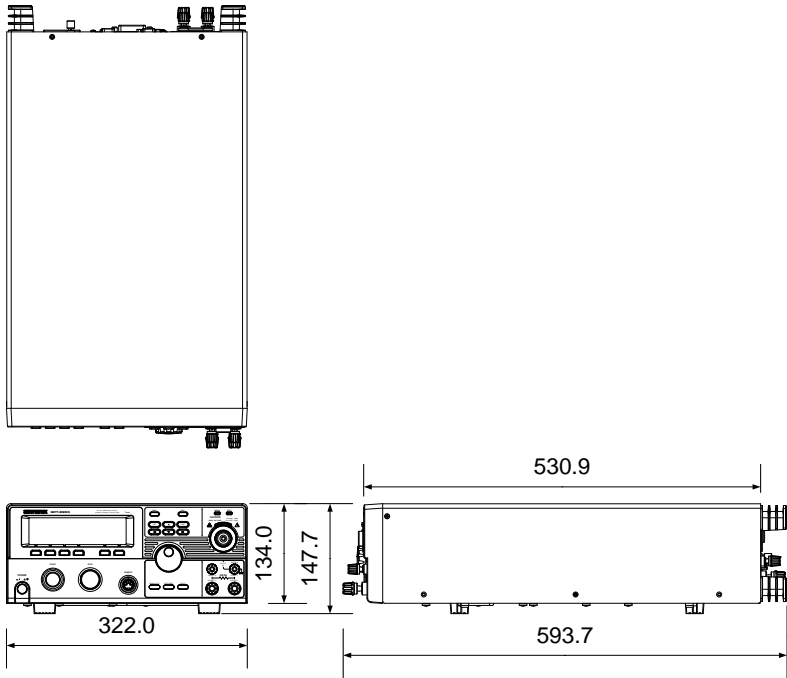
GPT-9901A/9902A/9903A Dimensions

425.9

134.0

147.7

322.0

482.0
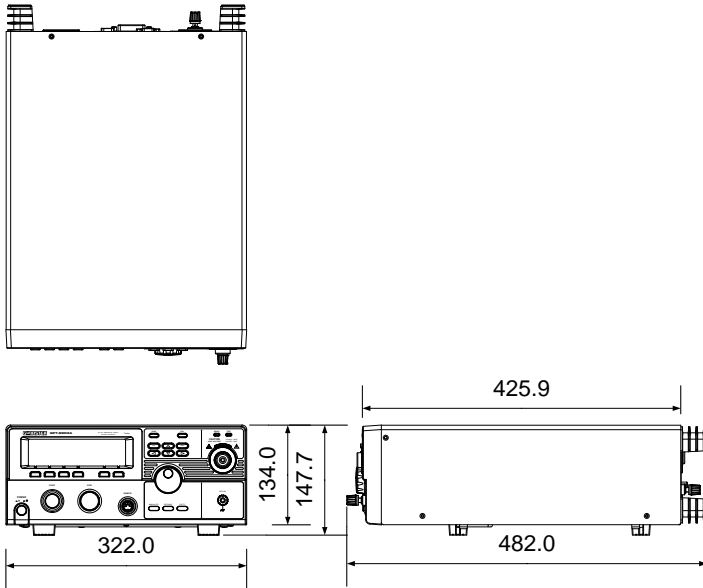
Certificate Of Compliance

We
GOOD WILL INSTRUMENT CO., LTD.
declare that the CE marking mentioned product
satisfies all the technical relations application to the product within the
scope of council:
Directive: EMC; LVD; WEEE; RoHS
The product is in conformity with the following standards or other
normative documents:

◎ EMC		
EN 61326-1 :	Electrical equipment for measurement, control and laboratory use — EMC requirements	
Conducted & Radiated Emission EN 55011 / EN 55032	Electrical Fast Transients EN 61000-4-4	
Current Harmonics EN 61000-3-2 / EN 61000-3-12	Surge Immunity EN 61000-4-5	
Voltage Fluctuations EN 61000-3-3 / EN 61000-3-11	Conducted Susceptibility EN 61000-4-6	
Electrostatic Discharge EN 61000-4-2	Power Frequency Magnetic Field EN 61000-4-8	
Radiated Immunity EN 61000-4-3	Voltage Dip/ Interruption EN 61000-4-11 / EN 61000-4-34	
◎ Safety		
EN 61010-1 :	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements	

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INDEX