Electrical Safety Analyzer

GPT-10000 Series

USER MANUAL

GW INSTEK

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-10000 unless you are qualified.

Position Guideline

⚠ WARNING

- The rear position of the GPT-10000 should be placed in an area with easy accessible for power disconnection, that is, unplugging the power cord with ease.
- Keep away from the device under test which connects with the GPT-10000 when test is underway. In addition, while test is ongoing, never touch the device under test, the GPT-10000 as well as other relevant units.
- Any inappropriate manner that is unspecified by the manufacturer may result in irreversible harms or impaired protection by the GPT-10000.

(Measurement categories) EN 61010-1:2010 specifies the measurement categories and their requirements as follows. The GPT-10000 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: AC 100V – 240V ± 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-10000	• 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-10000 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.

GETTING STARTED

This chapter describes the safety analyzer 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-12000 Series Overview

Series lineup

The GPT-12000 Series Safety Analyzers are AC/DC withstanding voltage, insulation resistance, ground bond and continuity safety analyzers.

The GPT-12001 is AC withstanding voltage and continuity tester, the GPT-12002 is AC/DC withstanding voltage and continuity tester and the GPT-12003 is AC/DC withstanding voltage, insulation resistance and continuity tester. The GPT-12004 includes all the test functions of the previous models, plus the ground bond testing. Also, for the all the models, the testing terminals are also mirrored on the rear panel for added safety and for more permanent safety testing environments.

The GPT-12000 Series can store up to 100 manual tests, as well as run up to 10 manual tests sequentially as an automatic test, allowing the safety analyzers 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, GB and CONT refer to AC Withstanding, DC Withstanding, Insulation Resistance, Ground Bond and Continuity testing, respectively.

Lineup Overview

Model name	ACW	DCW	IR	GB	CONT
GPT-12001	✓				✓
GPT-12002	✓	✓			✓
GPT-12003	✓	✓	✓		✓
GPT-12004	✓	✓	✓	✓	✓

Main Features

Performance
- ACW: 5kVAC
- DCW: 6kVDC
- IR: 50V~1200V (50V steps)*
- GB: 3A~30A
- CONT: 100mA

Features
- Ramp up time control
- Ramp down 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)
- Rear panel output

| 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-115x1	Test lead
	Region dependent	Power cord
	GTL-215x1	GB test lead
		(GPT-12004 only)
	GHT-119	Remote terminal cable
	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-246	USB cable (A to B type)
Options	Part number	Description
	Opt.01 GPIB Interface	GPIB module

Package Contents

Check the contents before using the GPT-12000 series.

Opening the box
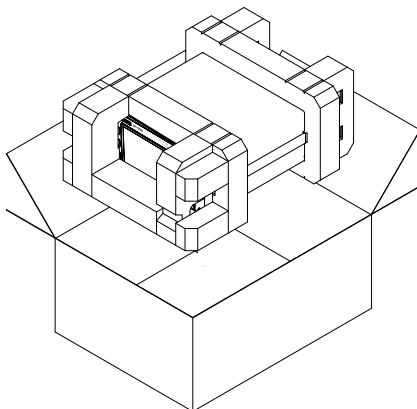
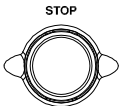| Contents (single unit)	• GPT-12000 unit	• GHT-115 test leads x1
	• Quick Start Guide	• GTL-215 GB test leads x1 (GPT-12004)
	• User manual CD	
	• CTC (Calibration Traceable Certificate)	• GHT-119 Remote terminal cable
	• Power cord x1 (region dependent)	• Interlock key

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

Front Panel Overview

GPT-12001/12002/12003/12004
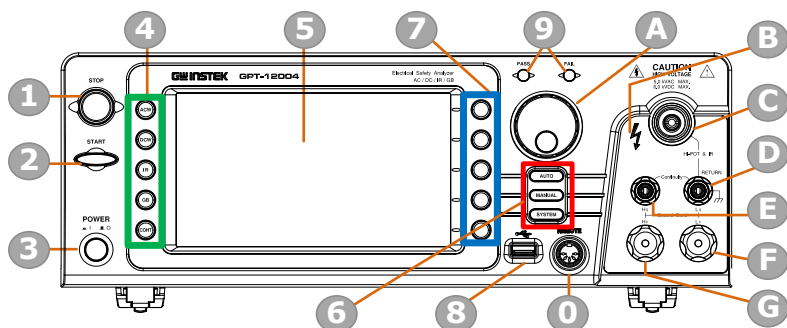
Item	Description
1	STOP Button
2	START Button
3	POWER Switch
4	Test Function Keys (Green Zone)
5	Display
6	Mode Keys (AUTO, MANUAL, SYSTEM in Red Zone)
7	Soft Keys (Blue Zone)
8	USB A-Type Host Port
9	PASS/FAIL Indicators
0	REMOTE Terminal
A	Scroll Wheel
B	HIGH VOLTAGE Indicator
C	HIGH VOLTAGE Output Terminal
D	SENSE L & RETURN Terminal
E	SENSE H & Output Terminal
F	SOURCE L (GPT-12004 only)
G	SOURCE H (GPT-12004 only)

STOP button	STOP	The STOP button is used to stop/cancel tests. The STOP button will also put the safety analyzer 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	Turns the power on. The safety analyzer will always start up with the last test setting from when the instrument was last powered down.

Test Function Keys — The keys indicate the 5 testing functions including ACW, DCW, IR, GB and CONT. Pressing one of the keys enters the function settings.

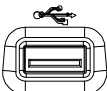Display — 7" Color TFT LCD display in 800 X 480 resolution

AUTO button — AUTO — Press to enter the AUTO test mode.
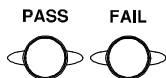
MANUAL button — MANUAL — Press to enter the MANUAL test mode.

SYSTEM button — SYSTEM — Press to enter the SYSTEM mode.

Soft Keys — The Soft keys correspond to the menu keys directly above on the main display.

USB Host Port — It can connect with USB flash drive for data storage.

| 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. |

| REMOTE terminal | REMOTE | The REMOTE terminal is used to connect to a remote controller. |

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

| HIGH VOLTAGE indicator | | The HIGH VOLTAGE indicator will light up red when an output terminal is active. Only after the test has finished or stopped will the indicator turn off. |

| HIGH VOLTAGE output terminal | CAUTION HIGH VOLTAGE 5.0 kVAC MAX. 6.0 kVDC MAX. HI-POT & IR | The HIGH VOLTAGE terminal output is used for outputting the testing voltage in ACW, DCW and IR tests. 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 | RETURN | The RETURN terminal is used for ACW, DCW, IR and CONT tests. |
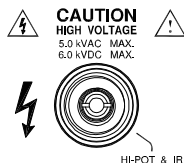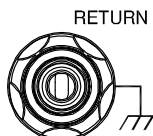
OUTPUT and RETURN terminals	All models	The OUTPUT terminal (red) and RETURN terminal (black) are used for CONT (Continuity) test.
SENSE H/L and SOURCE H/L terminals	GPT-12004 only	The SENSE H, SENSE L, SOURCE H and SOURCE L, terminals are used for GB (Ground Bond) test.
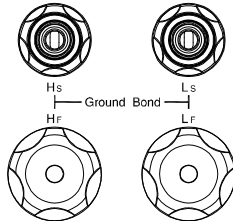
Rear Panel Overview

GPT-12001/12002/12003/12004
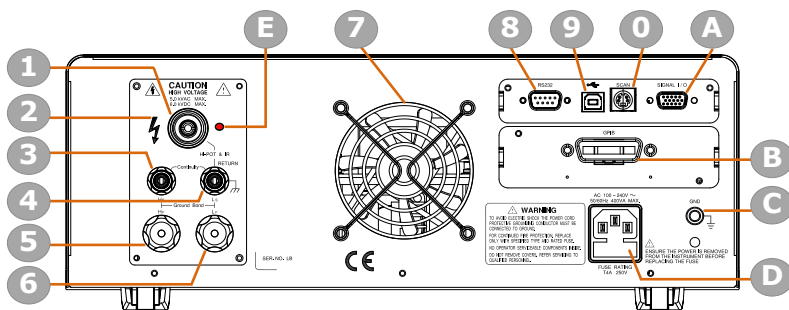
Item	Description
1	HIGH VOLTAGE Output Terminal
2	HIGH VOLTAGE Indicator
3	SENSE H & Output Terminal
4	SENSE L & RETURN Terminal
5	SOURCE H (GPT-12004 only)
6	SOURCE L (GPT-12004 only)
7	Fan
8	RS-232 Port
9	USB B-Type Interface Port
0	Scan Port (Reserved for future use)
A	Signal I/O Port
B	GPIB Port (Optional)
C	GND
D	AC Mains Input (Power Cord Socket)
E	HIGH VOLTAGE pilot lamp

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 B-Type port		The USB B-Type port is used for remote control.
RS232 interface port	RS232	The RS-232 port is used for remote control and firmware updates.
Scan interface port	SCAN	The scan port is reserved to be used to connect with GSB series models for multiple DUTs testing in either sequentially or concurrently.
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.
AC Mains Input	AC 100 – 240V ∼ 50/60Hz 400VA MAX. FUSE RATING T4A 250V	AC Mains Input for Power Cord Socket: 100 – 240 VAC ±10%. The fuse holder contains the AC mains fuse. For fuse replacement details, see page 45.
Optional GPIB port	GPIB	Optional GPIB interface for remote control.

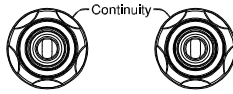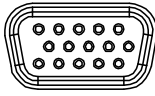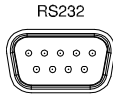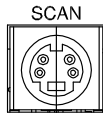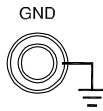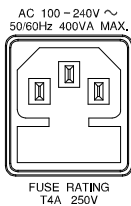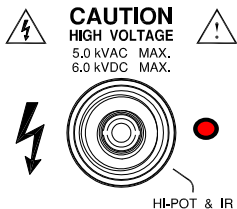|		
HIGH VOLTAGE output terminal	**CAUTION** **HIGH VOLTAGE** 5.0 kVAC MAX. 6.0 kVDC MAX. HI-POT & IR	The HIGH VOLTAGE terminal output is used for outputting the testing voltage in ACW, DCW and IR tests. The terminal is recessed for safety and used in conjunction with the RETURN terminal.
⚠ WARNING		USE EXTREME CAUTION. Do not touch the HIGH VOLTAGE terminal during testing.
HIGH VOLTAGE pilot lamp		The HIGH VOLTAGE pilot lamp will light up red when an output terminal is active. Only after the test has finished or stopped will the lamp turn off.
RETURN terminal	RETURN	The RETURN terminal is used for ACW, DCW, IR and CONT tests.
OUTPUT and RETURN terminals	All models Continuity	The OUTPUT terminal (red) and RETURN terminal (black) are used for CONT (Continuity) test.
SENSE H/L and SOURCE H/L terminals	GPT-12004 only Hs Ls Ground Bond HF LF	The SENSE H, SENSE L, SOURCE H and SOURCE L, terminals are used for GB (Ground Bond) test.
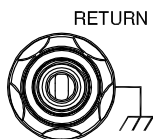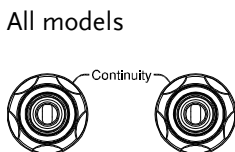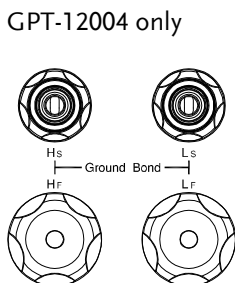
Set Up

Tilting the Stand

Horizontal
position

Place the unit on a flat surface horizontally.
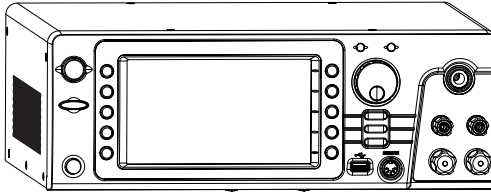
Tilt stand
position

Gently pull the 2 stands out from the bottom and
the unit will be placed in the tilt stand position.
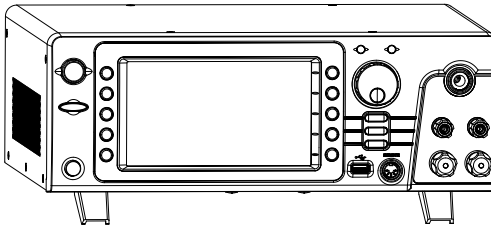
Line Voltage Connection and Power Up

Background   The GPT-12000 accepts line voltages of
                    100 - 240V at 50Hz or 60Hz.

Steps   1. Connect the power cord to
                        the AC Mains Input socket
                        on the rear panel.

                    GND
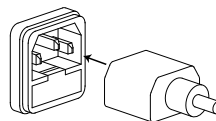
                    2. If the power cord does not
                        have an earth ground,
                        ensure the ground
                        terminal is connected to an
                        earth ground.
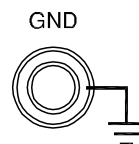
⚠ Warning   Ensure the power cord is connected to an earth
                    ground. Failure could be harmful to the operator
                    and instrument.

                    3. Press the Power button.
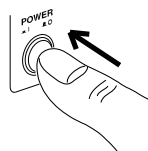
                    4. When the unit is powered up, the display will
                        show the last time parameters in either MANU
                        or AUTO test mode as shown below.

ACW
MANU: 001
MANU_NAME
HI SET:
1.000 mA
LOW SET:
 000 uA
TEST TIME:
000.3 s
RAMP TIME:
000.1 s
ARC FUNC:
OFF
ARC SET:
1.000 mA

0. 100 kV

mA

READY

PAGE
1 / 3
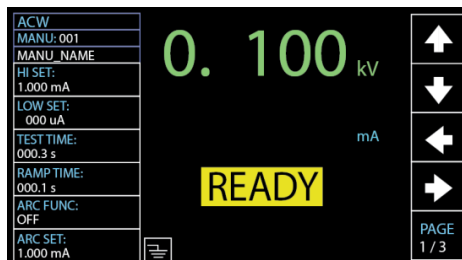
Installing the Optional GPIB Card

Background	The optional GPIB is a user-installable option. Follow the instructions below to install the GPIB card.
⚠ WARNING	Before installing optional GPIB card ensure the GPT-12000 is turned off and disconnected from power.
Steps	1. Remove screws from the rear panel cover plate.
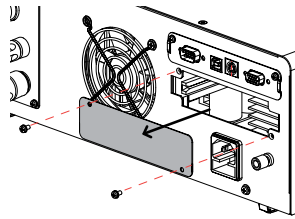
2. Insert the GPIB card into the opening of rear panel. Push the card gently until it is fully inserted followed by fastening the screws.

GPIB Card
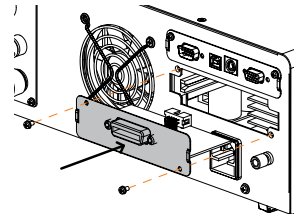
Workplace Precautions

Background	The GPT-12000 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-12000 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 analyzer.

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-12000 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-12000 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 analyzer, lead wires, terminals, probes and other connected equipment when the tester is testing.

2. Do not turn the safety analyzer 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 analyzer unattended. Always turn the power off when leaving the testing area.

9. When remotely controlling the safety analyzer, 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-12000 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 analyzer before a discharge is completed.

Basic Safety Checks

Background

The GPT-12000 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 analyzer is always connected to an earth ground.

3. Test the safety analyzer operation with a low voltage/current output:
   Ensure the safety analyzer 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-12000 safety analyzers. The testers have two main testing modes (MANU, AUTO), one system mode (SYSTEM) and 5 main operation statuses (READY, TEST, PASS, FAIL and STOP).
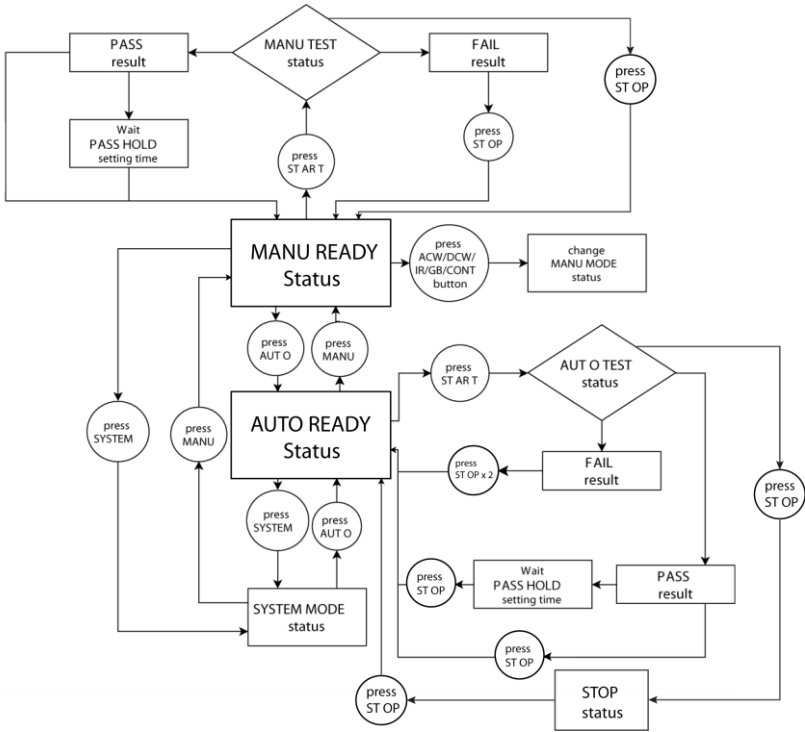
Menu Tree Overview

MANU Mode   MANU mode is used to create and/or execute a single test. Only under MANU mode can parameters be edited for each manual test.

MANU mode
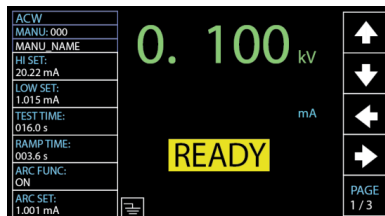
AUTO Mode   AUTO mode indicates that the tester is automatic, which consists of a sequential AUTO test of up to 10 MANU steps. Also, several groups of AUTO tests can be further interconnected for an advanced AUTO test.

AUTO mode

SYSTEM Mode

System mode covers the Display Set, Buzzer, Interface, Control, System Time, Data Initialize, Information, Statistics and USB Disk settings. These settings are system-wide and applied to both MANU and AUTO tests.

SYSTEM mode

READY Status (Yellow Color)

When the tester is in READY status of MANU or AUTO test, it is ready to begin testing. Pressing the START button will begin testing and put the tester into TEST status. Pressing the AUTO key will change from MANU – READY status to AUTO – READY status and vice versa.

READY status in MANU test

READY status in AUTO test

TEST Status
(Orange Color)

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 instantly. The TEST status in AUTO test is identical with that of MANU test.

TEST status in MANU test
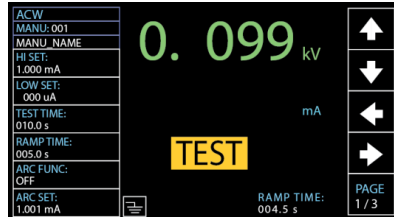
PASS Status
(Green Color)

When a MANU test result is within the range of HI and LOW sets, the PASS status is shown on display. For AUTO test, the PASS status only shows when all the affiliated test steps are passed.

PASS status in MANU test

PASS status in AUTO test

| FAIL Status (RED Color) | When a MANU test result is beyond the range of HI and LOW sets, the FAIL status is shown on display. For AUTO test, the FAIL status is shown when any of the test steps fails, even only one of them. |

FAIL status in MANU test

FAIL status in AUTO test

| STOP Status (Red Color) | STOP status is shown when an AUTO test did not finish running and has been stopped by user. Pressing STOP will return the tester to READY status. STOP status is not shown in MANU test as it returns to READY status directly after user pressed STOP button in MANU test. |

STOP status in AUTO test

Test Lead Connection

This section describes how to connect the GPT-12000 to a DUT for withstanding, insulation resistance, ground bond as well as continuity testing.

ACW, DCW, IR Connection

Background	ACW, DCW and IR tests use the HIGH VOLTAGE terminal and RETURN terminal with the GHT-115 test leads.

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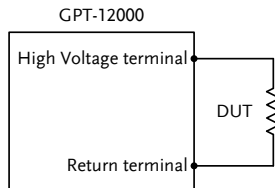
Steps
1. Turn the power off on the safety analyzer.

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.
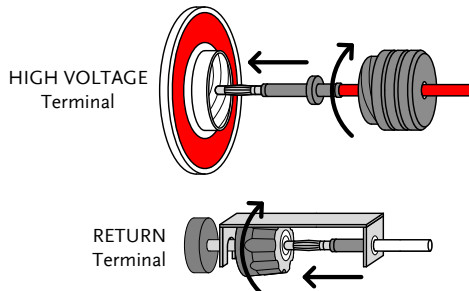
GB Connection

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

GB Connection

GPT-12000

Source H
Sense H
                DUT
Source L
Sense L
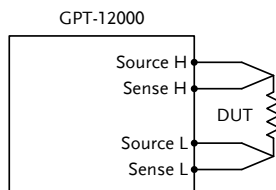
Steps   1. Turn the power off on the safety analyzer.

              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.

Sense H lead   Sense L lead

Source H lead   Source L lead

H_S ——— Ground Bond ——— L_S
H_F L_F
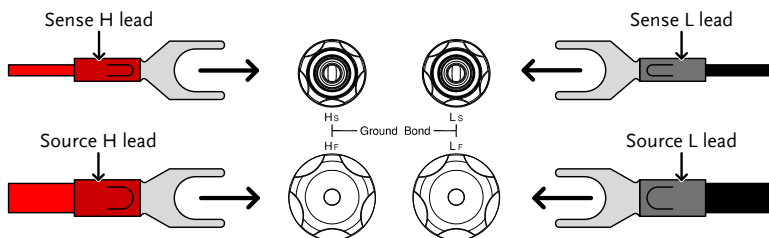
CONT Connection

Background   CONT tests use the OUTPUT and RETURN
                     terminals with the GTL-115 test leads.

CONT
Connection

GPT-12000

Output

DUT
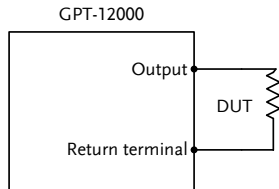
Return terminal

Steps   1. Turn the power off on the safety analyzer.

                 2. Connect the OUTPUT test lead (red) to the
                     OUTPUT terminal.

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

OUTPUT
Terminal

RETURN
Terminal
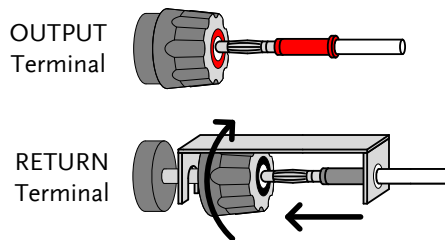
Manual Tests

This section describes how to create, edit and run a *single* ACW, DCW, IR, GB and CONT manual tests. 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 89).

- Setting the Test Function → from page 39.
- Choose/Recall a Manual Test Number → from page 40.
- Creating a MANU Test File Name → from page 41.
- Setting the Upper and Lower Limits → from page 42.
- Setting the Test Time → from page 44.
- Setting the Ramp Up Time → from page 46.
- Setting the Ramp Down Time → from page 48.
- Setting the Test Voltage or Test Current → from page 50.
- Setting the Test Frequency → from page 52.
- Setting a Reference Value → from page 53.
- Setting an Initial Voltage → from page 54.
- Setting the Wait Time → from page 56.
- Setting the ARC Function → from page 58.
- Setting MAX HOLD → from page 61.
- Setting PASS HOLD → from page 62.
- Setting IR Mode → from page 63.
- Setting GND OFFSET → from page 65.
- Setting GB Contact → from page 67.
- Zero Check for the Test Leads → from page 69.
- Setting the Grounding Mode → from page 72.
- Running a MANU Test → from page 76.
- PASS / FAIL MANU Test → from page 81.
- Special MANU Test Mode (000) → from page 87.
- Sweep Function → from page 89.

Setting the Test Function

Background	There are five test functions, AC Withstand, DC Withstand, Insulation Resistance, Ground Bond and Continuity tests.

Steps

1. If the tester is in AUTO or SYSTEM mode, press the MANUAL key to put the tester into MANU mode.

   [MANUAL]

2. To choose the test function, press the ACW, DCW, IR, GB or CONT key on the front panel.
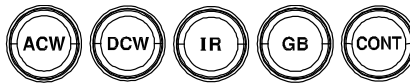
   (ACW) (DCW) (IR) (GB) (CONT)

3. The key of selected test function is lit, and the test function selected is shown on the upper-left corner of the display.

   Selected Test Function

Choose/Recall a Manual Test Number

Background   ACW, DCW, IR, GB and CONT tests can only
              be created and edited in the MANU 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 87 for details on the
              special mode.

Steps   1. If the tester is in AUTO or SYSTEM   [MANUAL]
             mode, simply press the MANUAL
             key to switch to MANU mode.

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

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

MANU number cursor

ACW		
MANU: 001 ←	0. 100 kV	
MANU_NAME		
HI SET: 1.000 mA		
LOW SET: 000 uA		mA
TEST TIME: 000.3 s		
RAMP TIME: 000.1 s	READY	
ARC FUNC: OFF		
ARC SET: 1.000 mA		PAGE 1 / 3
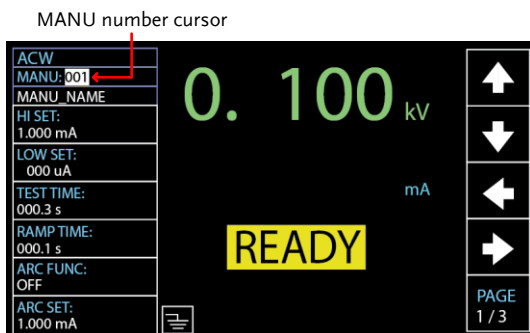
⚠ Note   Manual number can only be selected   STOP
          or recalled when the "READY" status
          shows on the screen. If the "FAIL"
          status appears, it is required to press
          STOP key first before selecting or
          recalling procedure.
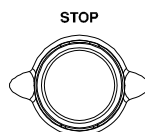
Creating a MANU Test File Name

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

                      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

Steps   1. Press the UP / DOWN arrow soft-
                        keys to bring the cursor to the
                        MANU_NAME (default name) field.
                        The characters table will appear in
                        the right hand accordingly.
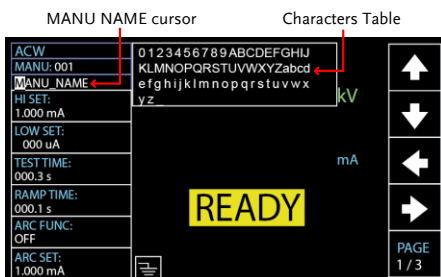
MANU NAME cursor   Characters Table

ACW
MANU: 001   0123456789ABCDEFGHIJ
MANU_NAME   KLMNOPQRSTUVWXYZabcd
HI SET: efghijklmnopqrstuvwx   kV
1.000 mA   yz
LOW SET:
  000 uA
TEST TIME: mA
000.3 s
RAMP TIME:
000.1 s   READY
ARC FUNC:
OFF
ARC SET: PAGE
1.000 mA   1 / 3

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

                     3. Press the LEFT / RIGHT arrow soft-
                        keys to move the cursor to the next
                        character.

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

⚠ Note   Neither number (0 – 9) nor underline (_) can be
                     set for the 1st character in MANU test file name.

Setting the Upper and Lower Limits

| Background | There is both a LOW and HI judgment setting. When the measured value is below the LOW 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 LOW SET and HI SET setting is judged as PASS. The LOW SET limit cannot be made greater than the HI SET limit. |

Steps

1. Press the UP / DOWN arrow soft-keys to bring the cursor to the HI SET setting.
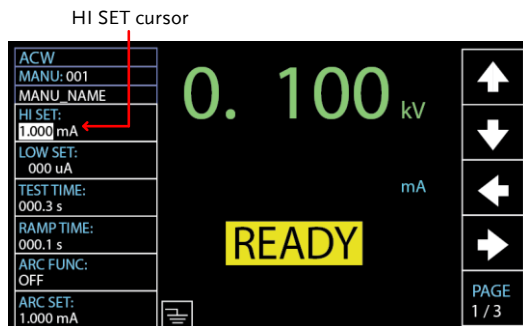
HI SET cursor

2. Use the scroll wheel to set the HI SET limit.

ACW (HI)	0.001mA~042.0mA
DCW (HI)	0.001mA~011.0mA
IR (HI)	000.2MΩ~50.00GΩ
GB (HI)	000.1mΩ ~ 650.0mΩ
CONT (HI)	00.01Ω ~ 90.00Ω

3. Press the UP / DOWN arrow soft-keys to bring the cursor to the LOW SET setting.

LOW SET cursor
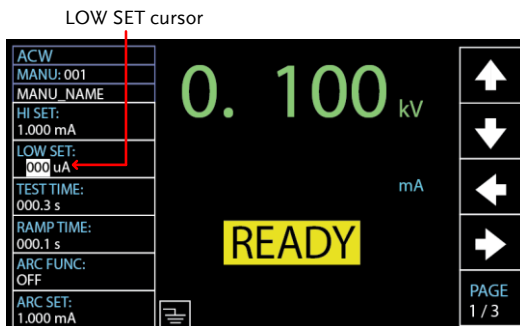
4. Use the scroll wheel to set the LO SET limit.

ACW (LOW)	0.000mA~041.99mA
DCW (LOW)	0.000mA~010.9mA
IR (LOW)	000.1MΩ~49.99GΩ
GB (LOW)	000.0mΩ ~ 649.9mΩ
CONT (LOW)	00.00Ω ~ 89.99Ω

⚠ 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, respectively.

Setting the Test Time

Background | This setting is used to set the test time for a test. The test time determines how long the test voltage or current is applied to the DUT. This test time does not include RAMP UP time or RAMP DOWN time (note: GB and CONT do not have RAMP UP or RAMP DOWN). The test time can be set from 0.3 seconds to 999.9 seconds for ACW, DCW, IR, GB and CONT, with a resolution of 0.1 seconds for all modes. Also, the test time can be turned off when using the ACW or DCW test functions.

Each test has a RAMP UP and RAMP DOWN time (except GB and CONT), respectively. Refer to page 46 & 48 for more details.

Output Voltage Timing Chart (Resistive load)
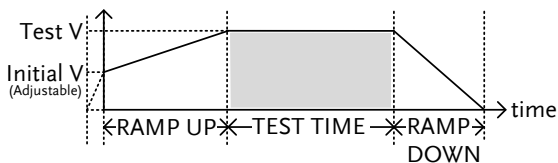
Steps

1. Press the UP / DOWN arrow soft-keys to bring the cursor to the TEST TIME setting.
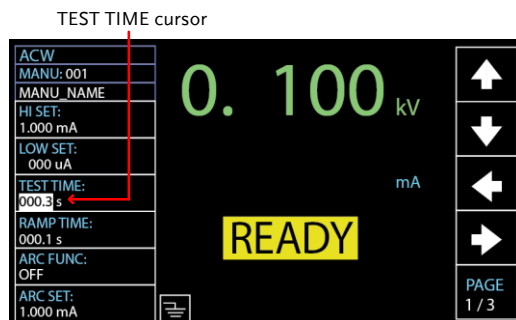
2. Use the scroll wheel to set the
   TEST TIMER value.

ACW	000.3s~999.9s
DCW	000.3s~999.9s
IR	000.3s~999.9s
GB	000.3s~999.9s
CONT	000.3s~999.9s

⚠ Note

With the ACW test function, when the test current is beyond 30mA, the Ramp Up 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.

Turn Off Test Time

When in either ACW or DCW test, the TEST TIME can be turned off, which means the test without test time will last infinitely until FAIL judgment occurs.

Identical with the regular setting for TEST TIME, turn off the timer by using the scroll wheel to set OFF for TEST TIME value.

TEST TIME OFF

ACW	
MANU: 001	
MANU_NAME	
HI SET: 1.000 mA	0. 100 kV
LOW SET: 000 uA	
TEST TIME: OFF	mA
RAMP TIME: 000.1 s	READY
ARC FUNC: OFF	
ARC SET: 1.000 mA	PAGE 1/3
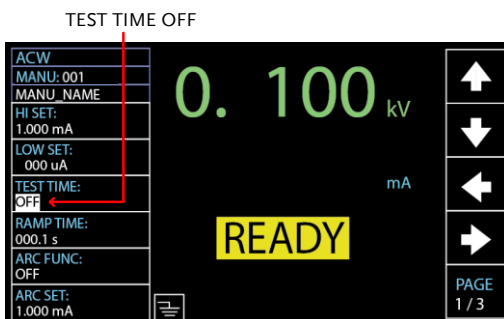
Setting the Ramp Up Time

Background

The Ramp Up time is the total time taken for the tester to reach the test voltage level. The Ramp Up time starts 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.

Output Voltage Timing Chart (Resistive load)
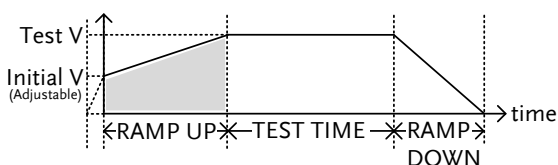
Steps

1. Press the UP / DOWN arrow soft-keys to bring the cursor to the RAMP TIME setting.
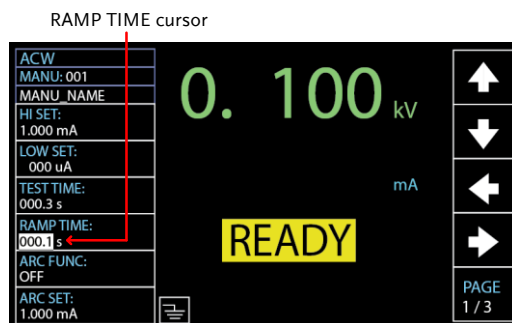
2. Use the scroll wheel to set the RAMP TIME value.

ACW	000.1s~999.9s
DCW	000.1s~999.9s
IR	000.1s~999.9s

Ramp Time
Duration
Indicator

After pressing START to begin a test with set RAMP TIME, a section at the lower right corner of display shows the counting duration of RAMP TIME, which will run to the set value followed by the test time. See the screenshot shown below.
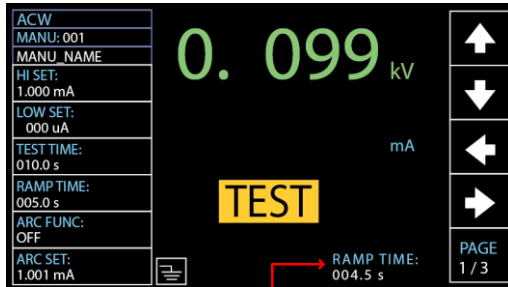
RAMP TIME duration indicator

Setting the Ramp Down Time

Background   The Ramp Down time is the time taken for the
                     DUT to discharge the test voltage level. The
                     Ramp Down time can be set from 000.0 to 999.9
                     seconds. The Ramp DOWN time is only
                     applicable for ACW, DCW and IR tests.

Output Voltage
Timing Chart
(Resistive load)
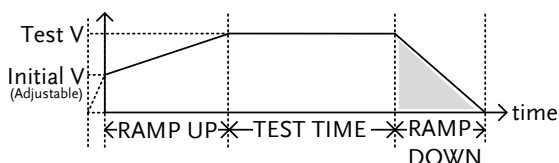
Steps   1. Press the PAGE soft-key to move to
                        the 2/3 page where RAMP DOWN
                        setting appears for ACW and DCW.

                        PAGE
                        2 / 3

                        As for IR test, the RAMP DOWN
                        setting shows in the 2/2 page.

                        PAGE
                        2 / 2

                     2. Press the UP / DOWN arrow soft-
                        keys to bring the cursor to the
                        RAMP DOWN setting.

RAMP DOWN cursor

3. Use the scroll wheel to set the
    RAMP DOWN value.

ACW	000.0s~999.9s
DCW	000.0s~999.9s
IR	000.0s~999.9s

Ramp Down
Duration
Indicator

After the set TEST TIME is fully completed, a
section at the lower right corner of display
shows the counting duration of RAMP DOWN,
which will run to the set value by user. See the
screenshot shown below.
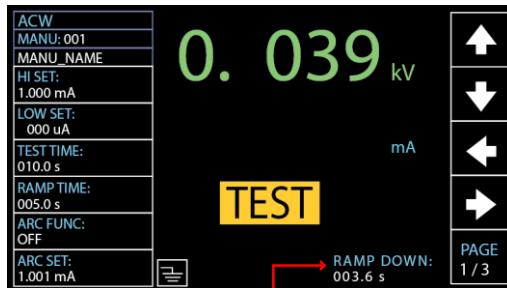
RAMP DOWN duration indicator

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. As for CONT test, the test current is fixedly set at the default value of 100mA.

Steps	1. Press the UP / DOWN arrow soft-keys to bring the cursor to the voltage or ampere setting depending on selected test function.

Test Voltage / Current cursor region


```
ACW
MANU: 001
MANU_NAME
HI SET:
1.000 mA
LOW SET:
000 uA
TEST TIME:
000.3 s
RAMP TIME:
000.1 s
ARC FUNC:
OFF
ARC SET:
1.000 mA
```

0. 100 kV

mA

READY

PAGE
1 / 3
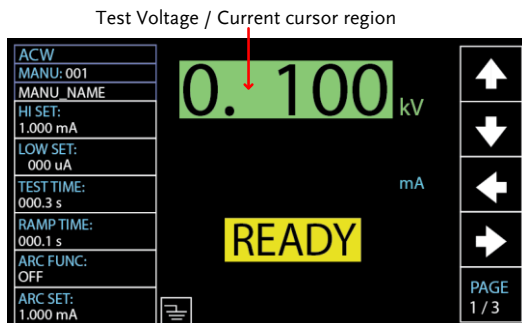
2. Use the scroll wheel to set the test voltage or ampere level.

ACW	0.050kV ~ 5kV [1]
DCW	0.050kV ~ 6kV [2]
IR	0.05kV ~ 1kV (50V steps)
GB	3.00A ~ 33.00A
CONT	100mA [3]

[1] At least 0.3 seconds is needed to reach a set voltage of 50V/10mA.

[2] At least 0.3 seconds is needed to reach a set voltage of 50V/2mA.

[3] Test current for CONT is fixed at 100mA

⚠ Note

When setting the current, be aware that a maximum of 200VA can be set for ACW and 50W for DCW, respectively.

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.
⚠️ Note	The test frequency can only be set for ACW or GB tests.
Steps	1. Press the PAGE soft-key to move to the 2/3 page where FREQ setting appears for ACW.

<div style="text-align:right">PAGE 2 / 3</div>

As for GB test, the FREQ setting shows in the 1/2 page directly.

<div style="text-align:right">PAGE 1 / 2</div>

2. Press the UP / DOWN arrow soft-keys to bring the cursor to the FREQ setting.

FREQ setting cursor

3. Use the scroll wheel to set the test frequency.

ACW, GB   50Hz, 60Hz

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, CONT).

Steps
1. Press the PAGE soft-key to move to the 3/3 page where REF VALUE setting appears for ACW and DCW.

   PAGE 3 / 3

   As for IR and GB, the REF VALUE setting shows in the 2/2 page.

   PAGE 2 / 2

   The REF VALUE setting appears in the 1/1 page directly for CONT.

   PAGE 1 / 1

2. Press the UP / DOWN arrow soft-keys to bring the cursor to the REF VALUE setting.

REF VALUE cursor
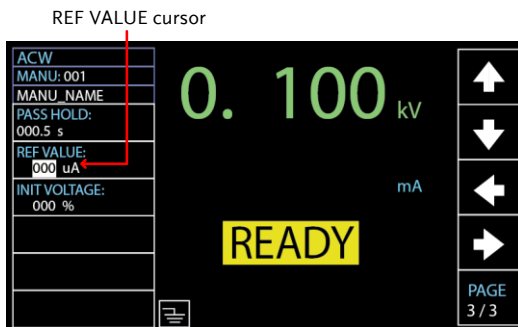
3. Use the scroll wheel to set the REF value.

ACW	0.000mA~HI SET current-0.1mA *HI SET + REF value ≤ 42.00 mA
DCW	0.000mA~HI SET current-0.1mA *HI SET + REF value ≤ 11.00 mA
IR	000.0MΩ~50.00GΩ
GB	000.0mΩ~650.0mΩ *ISET x (HI SET + REF value) is no greater than 7.2V
CONT	00.00Ω~90.00Ω *ISET(100mA) x (HI SET + REF value) is no greater than 9V

Note

For IR test, a reference value of tester can be automatically created via the GND OFFSET function. See page 65 for details.

For GB and CONT tests, a reference value of test lead can be automatically created via the ZERO CHECK function. See page 69 for details.

Setting an Initial Voltage

Background

In essence, the test voltage for both ACW and DCW will gradually and linearly rise up, from zero, to the target set voltage in accord with the set RAMP TIME ahead of the TEST TIME.

Nevertheless, under certain circumstances, user may have preferences on the percentage of starting test voltage. Therefore, the INIT VOLTAGE provides another alternative for different applications on user side.

It is easy to set a preferred percentage of the test voltage in the INIT VOLTAGE setting and the starting test voltage will commence from

the value corresponding to the set percentage relative to the target test voltage.

⚠ Note

INIT VOLTAGE setting is only applicable to both ACW and DCW tests.

Steps

1. Press the PAGE soft-key to move to the 3/3 page where the INIT VOLTAGE setting appears for ACW and DCW.

   PAGE 3 / 3

2. Press the UP / DOWN arrow soft-keys to bring the cursor to the INIT VOLTAGE setting.

   ⬆⬇

INIT VOLTAGE cursor

3. Use the scroll wheel to set the percentage of INIT VOLTAGE.

   INIT VOLTAGE   000% ~ 099%

Setting the Wait Time

Background | The Wait Time refers to the pending time before FAIL judgment appears. By default, FAIL judgment appears when Test Time has reached 0.3 second at the earliest manner. However, when user sets 1.0 second for Wait Time on the tester with 0.5 second of Ramp Up time and 1.0 second of Test Time, the FAIL judgment will be shown when Test Time has reached 0.5 second. In short, Wait Time is the pending duration which dominates the priority over both Ramp UP time and Test Time in terms of timing of FAIL judgment.

The WAIT TIME is only applicable for ACW, DCW and IR tests.

Steps | 1. Press the PAGE soft-key to move to the 2/3 page where WAIT TIME setting appears for ACW and DCW.

PAGE 2 / 3

As for IR test, the WAIT TIME setting shows in the 1/2 page.

PAGE 1 / 2

2. Press the UP / DOWN arrow soft-keys to bring the cursor to the WAIT TIME setting.

WAIT TIME cursor

Wait Time
Indicator

While the WAIT TIME is set, the indicator of WAIT
TIME will be shown on the display in the set
duration during a test progress for clear
identification for user.
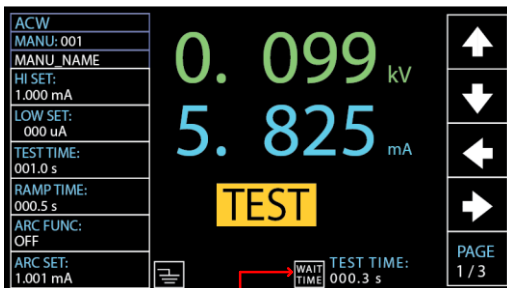
WAIT TIME indicator

Setting the ARC Function

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 & CONT, ON & STOP.
The ON & CONT setting will detect arcs over the ARC current level and continue the test, the ON & STOP setting will stop the test when an arc is detected.

ARC mode settings only apply to both ACW and DCW tests.

Steps   1. Press the UP / DOWN arrow soft-keys to bring the cursor to the ARC FUNC setting.

ARC FUNC cursor
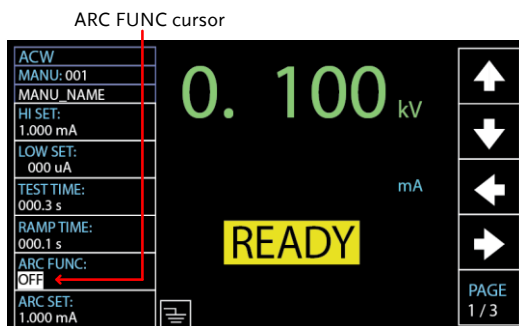
2. Use the scroll wheel to set the ARC modes setting.

ARC MODES: OFF
                        ON & CONT
                        ON & STOP

3. If the ARC MODE was set to either
    ON & CONT, or ON & STOP, the
    ARC current level can be edited.
    Press the DOWN arrow soft-key to
    bring the cursor to the ARC SET
    setting field.

ARC SET cursor

ACW
MANU: 001
MANU_NAME
HI SET:
1.000 mA
LOW SET:
 000 uA
TEST TIME:
000.3 s
RAMP TIME:
000.1 s
ARC FUNC:
OFF
ARC SET:
1.001 mA

0. 100 kV

mA

READY
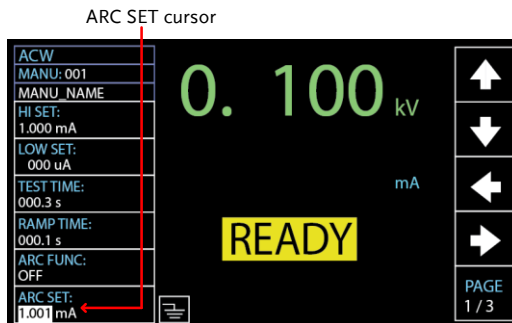
PAGE
1 / 3

4. Use the scroll wheel to edit the
    ARC SET level.

| ACW | 1.000mA~080.0mA |
| DCW | 1.000mA~080.0mA |

5. If the ARC MODE was set to either
    ON & CONT, or ON & STOP, the
    ARC speed, which indicates the
    threshold for width of detected
    ARC, can be edited. Press the PAGE
    soft-key to move to the 2/3 page
    where ARC SPEED setting appears
    for ACW and DCW.

PAGE
2 / 3

6. Press the UP / DOWN arrow soft-keys to bring the cursor to the ARC SPEED setting field.

ARC SPEED cursor
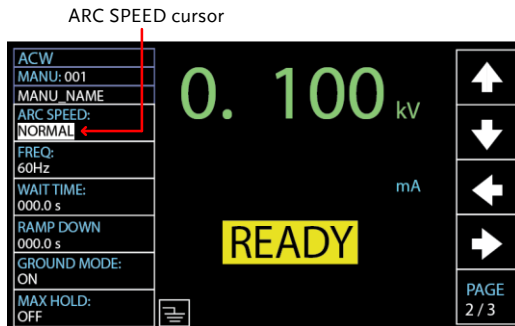
7. Use the scroll wheel to select the ARC SPEED modes.

ARC SPEED	FAST	Threshold for the narrowest width of detected arc, which is the most sensitive manner.
	NORMAL	Threshold for the general width of detected arc.
	SLOW	Threshold for the widest width of detected arc, which is the manner of high tolerance.

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 the IR and GB tests.

                  For instance, when running an IR test with 120
                  seconds of test time and MAX HOLD enabled,
                  the highest resistance measured in the 30
                  seconds of the test time will be retained on
                  display until the next largest value. If there is
                  no further maximum resistance occurred, the
                  value measured in 30 seconds will be remained
                  till the end of the test of 120 seconds.

Steps   1. Press the PAGE soft-key to move to   **PAGE**
                the 2/3 page where MAX HOLD   **2 / 3**
                setting appears for ACW and DCW.

                As for IR and GB, the MAX HOLD   **PAGE**
                setting shows in the 2/2 page.   **2 / 2**

             2. Press the UP / DOWN arrow soft-
                keys to bring the cursor to the MAX
                HOLD setting.

                       MAX HOLD cursor

                ┌──┐
                │ ACW   │
                │ MANU: 001   0. 100 kV   ▲   │
                │ MANU_NAME   │
                │ ARC SPEED: ▼   │
                │ NORMAL   │
                │ FREQ: │
                │ 60Hz   │
                │ WAIT TIME: mA   ◄   │
                │ 000.0 s   │
                │ RAMP DOWN   │
                │ 000.0 s   READY   ►   │
                │ GROUND MODE: │
                │ ON   │
                │ MAX HOLD: PAGE   │
                │ OFF   2 / 3   │
                └──┘
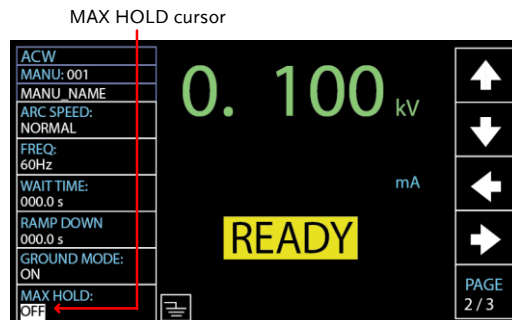
3. Use the scroll wheel to set MAX HOLD.

MAX HOLD   OFF, ON

Setting PASS HOLD

Background | The PASS HOLD setting refers to the holding duration after PASS judgment is shown on the display. When the PASS HOLD setting is set, a PASS judgment is held until the set duration is fully reached.

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

Steps | 1. Press the PAGE soft-key to move to the 3/3 page where PASS HOLD setting appears for ACW.

PAGE 3 / 3

And it is the 2/3 page where PASS HOLD setting appears for DCW.

PAGE 2 / 3

As for IR and GB, the PASS HOLD setting shows in the 2/2 page.

PAGE 2 / 2

The PASS HOLD setting appears in the 1/1 page directly for CONT.

PAGE 1 / 1

2. Press the UP / DOWN arrow soft-keys to bring the cursor to the PASS HOLD setting.

PASS HOLD cursor
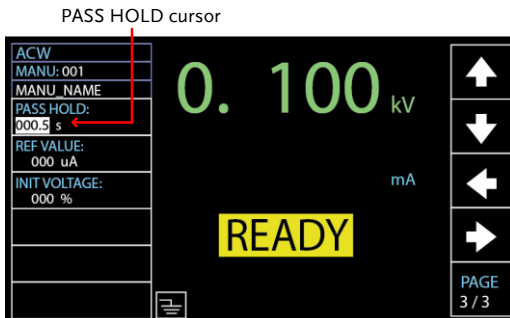
3. Use the scroll wheel to set PASS HOLD duration.

PASS HOLD   000.0s ~ 999.9s

⚠️ Note

The STOP key can be pressed at any time in the set duration of PASS HOLD to promptly halt the set PASS HOLD duration. In short, user can stop, if necessary, the duration of PASS HOLD any time.

Setting IR Mode

Background

The IR MODE setting, which contains three options, STOP ON FAIL, STOP ON PASS, TIMER, only applies to IR test.

When IR MODE is set to STOP ON FAIL, the tester will show the FAIL judgment, if available, in the 0.3 second of test time at the earliest manner, regardless of the set test time.

When set to PASS ON FAIL, the tester will show the PASS judgment, if available, in the 0.3 second of test time at the earliest manner, regardless of the set test time.

The TIMER mode will run a test in a full course

completely in accordance with the set test time, whether the final judgment is PASS or FAIL.

⚠️ Note

If the DUT is under the situation of abnormal measurement, e.g., short circuit, the FAIL judgment of SHORT warning, though TIMER is set, will appear in the early manner regardless of the set test time.

Steps

1. Press the PAGE soft-key to move to the 2/2 page where IR MODE setting appears for IR test.

PAGE 2 / 2

2. Press the UP / DOWN arrow soft-keys to bring the cursor to the IR MODE setting.

⬆️⬇️

IR MODE cursor

3. Use the scroll wheel to set the IR MODE.

IR MODE	STOP ON FAIL
	STOP ON PASS
	TIMER

Setting GND OFFSET

Background   The GND OFFSET is used to determine the offset resistance of the tester. When a GND OFFSET is performed, the reference is automatically set to the measured resistance.

⚠ Note   GND OFFSET setting is only applicable to IR test.

Steps
1. Press the PAGE soft-key to move to the 2/2 page where GND OFFSET setting appears for IR testing.

PAGE 2 / 2

2. Press the UP / DOWN arrow soft-keys to bring the cursor to the GND OFFSET setting. When selecting ON, the ZERO CHECK indicator will be shown on the display.

⬆⬇

GND OFFSET cursor   ZERO CHECK indicator

3. Press the START button to perform the GND OFFSET. The resistance of the tester, after the GND OFFSET has finished, will be added into the REF VALUE field as the display shown below.
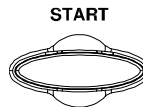
START

Resistance of the tester

Setting GB Contact

Background	Basically, GB test has no ramp up time and thus starts from the set test time by user directly. However, due to some cases where a buffer time before test time is in fact required for GB test, e.g., in conveyor where DUTs are tested for GB by batches and certain buffer duration needed for test leads or jigs connecting with DUTs, the GB CONTACT setting practically allows user to apply to customized scenarios when necessary occurs.

⚠ Note   GB CONTACT setting is only applicable to GB test.

Steps   1. Press the UP / DOWN arrow soft-
                  keys to bring the cursor to the GB
                  CONTACT setting.

GB
MANU: 001
MANU_NAME
HI SET:
100.0 mΩ
LOW SET:
000.0 mΩ
TEST TIME:
003.0 s
FREQ:
60Hz
GB CONTACT:
000.0 s
GROUND MODE:
ON

03. 00 A

mΩ

READY

PAGE
1 / 2
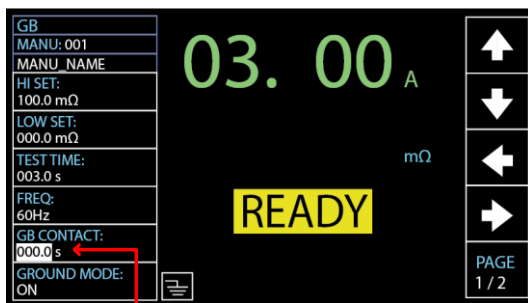
GB CONTACT cursor

2. Use the scroll wheel to set the
   value of GB CONTACT

   GB CONTACT   000.0 s ~ 999.9 s

GB CONTACT
Duration
Indicator

After every parameter including GB CONTACT is well set, press START to begin the GB test. A section at the lower right corner of display shows the counting duration of GB CONTACT, which will run to the set value followed by the test time. See the screenshot shown below.
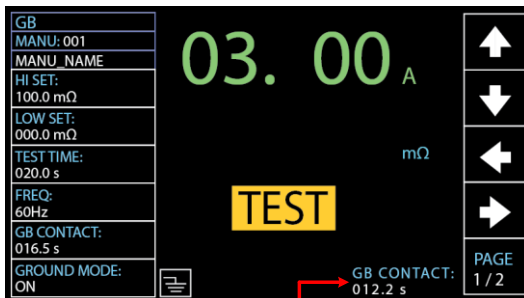
GB CONTACT duration indicator

Zero Check for the Test Leads

Background | The Zeroing function is used to determine the resistance of the test leads for GB and CONT tests. When a ZERO CHECK is performed, the reference is automatically set to the measured resistance of the test leads.

⚠ Note | ZERO CHECK setting is only applicable to both GB and CONT tests.

Steps | 1. Short the positive and negative alligator clips as shown below.
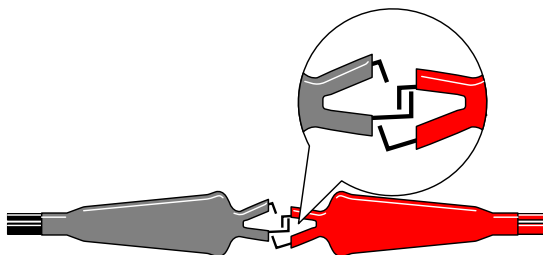
2. Press the PAGE soft-key to move to the 2/2 page where ZERO CHECK setting appears for GB testing.

   PAGE 2/2

   As for CONT, ZERO CHECK setting shows in the 1/1 page directly.

   PAGE 1/1

3. Press the UP / DOWN arrow soft-keys to bring the cursor to the ZERO CHECK setting. When selecting ON, the ZERO CHECK indicator will be shown on the display.

ZERO CHECK cursor   ZERO CHECK indicator
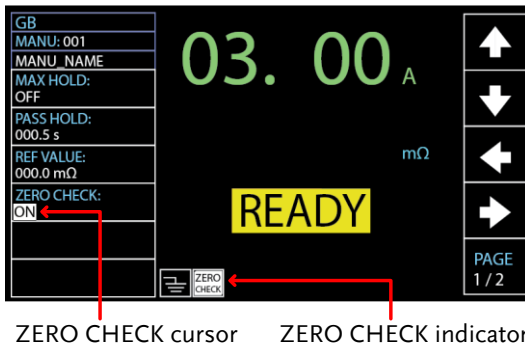
4. Press the START button to perform the zero check. The resistance of the test leads, after the ZERO CHECK has finished, will be added into the REF VALUE field as the display shown below.

START

Resistance of the test leads
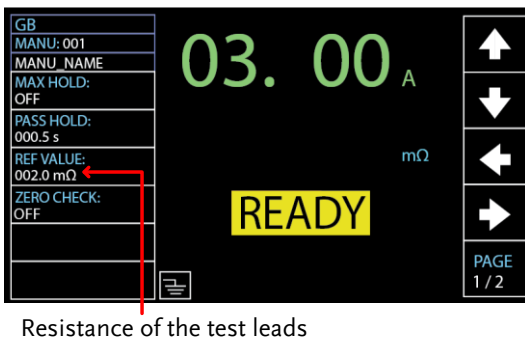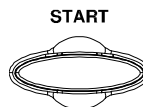
⚠ Note   Remember to replace the test leads to the proper position on the DUT before testing.

FAIL – GBI LOW

If SOURCE H/L terminals are open or poorly connected, the FAIL – GBI LOW status will appear on the screen. Please re-check the connection of SOURCE H/L terminals again.
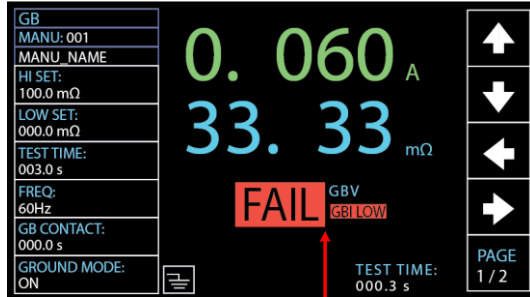
FAIL – GBI LOW status

REF VALUE = 0

Press STOP button to exit and the resistance of test leads were not properly added into the REF VALUE, which shows 000.0 mΩ as shown below. Re-check the connection of SOURCE H/L terminals and press START button again to proceed to the ZERO CHECK procedure.

START
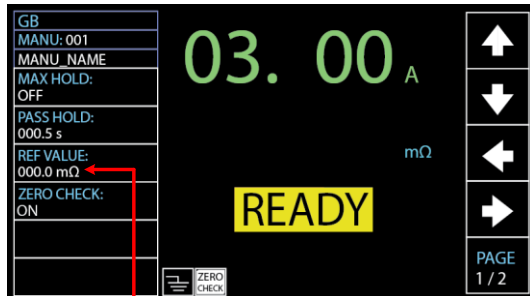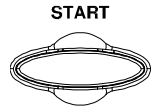
REF VALUE = 0

Setting the Grounding Mode

Background

When GROUND MODE is set to ON, the GPT-12000 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.

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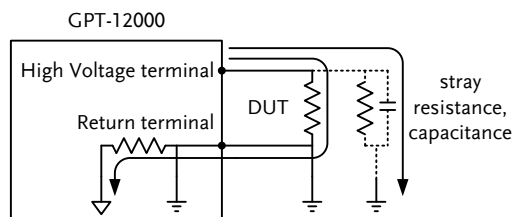
GROUND MODE = ON, DUT floating

GPT-12000

High Voltage terminal

Return terminal

DUT

stray resistance, capacitance
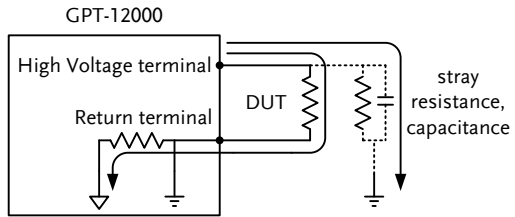
GROUND MODE = OFF, DUT floating

GPT-12000

High Voltage terminal

Return terminal

DUT

stray resistance, capacitance

GPT-12000 (GB testing)

Source H

Sense H

Sense L

Source L

DUT

stray resistance, capacitance
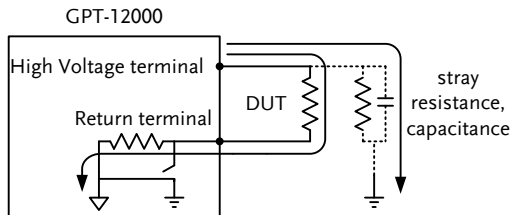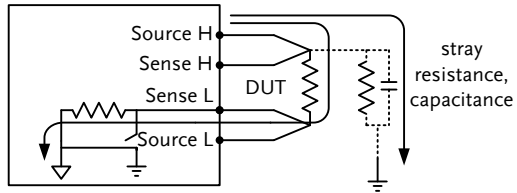
GROUND MODE = OFF, DUT grounded
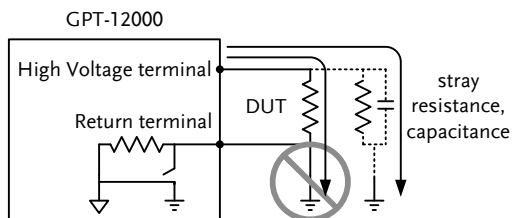
GPT-12000

GPT-12000 (GB testing)
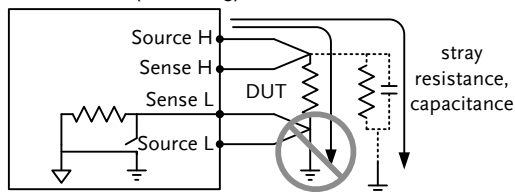
⚠ Warning	When GROUND MODE is set to OFF, the DUT, fixtures or connected instrumentation cannot be grounded. This will short circuit the internal circuitry during a test.
	For ACW and DCW tests, if it is not known whether the DUT test setup is grounded or not, always set GROUND MODE to ON.
	Only set GROUND MODE to OFF when the DUT is floating electrically.

Steps	1. Press the PAGE soft-key to move to the 2/3 page where GROUND MODE setting appears for ACW and DCW.	PAGE 2 / 3
	As for IR and GB, the GROUND MODE setting shows in the 1/2 page.	PAGE 1 / 2
	2. Press the UP / DOWN arrow soft-keys to bring the cursor to the GROUND MODE setting.	⬆⬇

GROUND MODE cursor
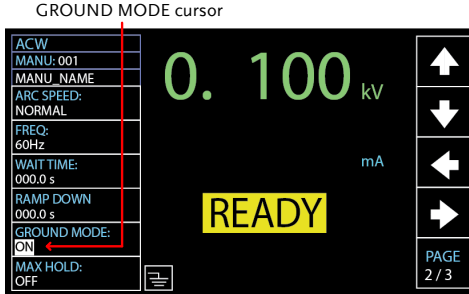
3. Use the scroll wheel to set the GROUND MODE.

   GROUND MODE   OFF, ON

4. The GROUND MODE icon on the display changes accordingly.
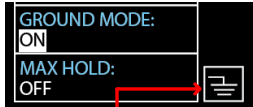
GROUND MODE ON   GROUND MODE OFF

Note
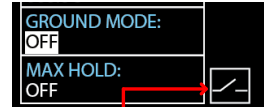
Under the IR test mode, when GROUND MODE is ON but test time is set < 0.5s, the error message "TEST TIMR<0.5s" will be shown, by which user is not able to start the IR test mode unless the test time is reset to > 0.5s. Refer to page 44 for how to set the test time manually.

GROUND MODE ON   Error Message Prompts

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 212 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 123).

- 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 87 for details.

Steps	1. Ensure the tester is in READY status for the test to come.	Page 32

READY status

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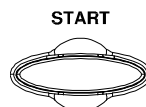
START

TEST status
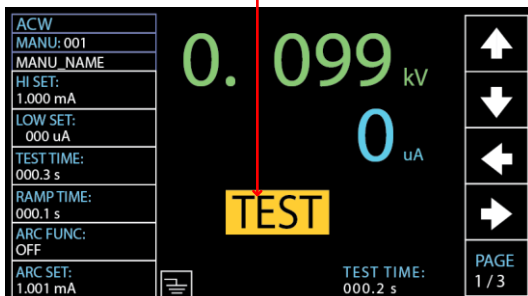
3. The test will start by showing the ongoing ramp up time followed by the ongoing test time and the ongoing ramp down time. The test will continue until the test is finished or stopped.

RAMP UP TIME

Ongoing RAMP UP TIME

TEST TIME

Ongoing TEST TIME

RAMP DOWN TIME

Ongoing RAMP DOWN TIME

⚠ Note | RAMP DOWN time only appears when user has activated it. See page 48 for details.

ACW Example   Test Voltage   Measured Current

DCW Example   Test Voltage   Measured Current

IR Example   Test Voltage   Measured Resistance

GB Example   Test Current   Measured Resistance

GB	
MANU: 001	
MANU_NAME	03. 01 A
HI SET: 370.0 mΩ	
LOW SET: 000.0 mΩ	200. 7 mΩ
TEST TIME: 003.0 s	
FREQ: 60Hz	TEST
GB CONTACT: 000.0 s	
GROUND MODE: ON	TEST TIME: 002.3 s PAGE 1 / 2

CONT Example   Test Current   Measured Resistance

CONT	
MANU: 001	
MANU_NAME	100 mA
HI SET: 02.00 Ω	
LOW SET: 00.00 Ω	1. 07 mΩ
TEST TIME: 003.0 s	
PASS HOLD: 000.5 s	TEST
REF VALUE: 00.00 Ω	
ZERO CHECK: OFF	TEST TIME: 002.6 s PAGE 1 / 1

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 and the
                     tester will restore to READY status.
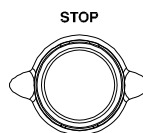
⚠ Note   Do not touch any terminals, test leads or any other
                connections when the test is on.

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 212 for a list of error messages.

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

PASS

PASS Judgment
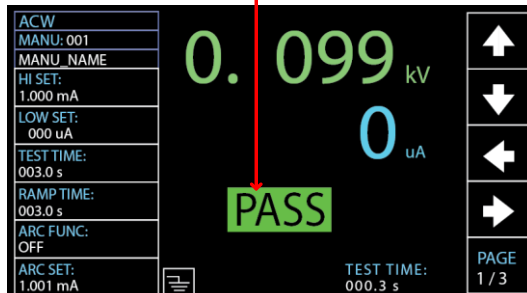
2. The tester will immediately restore back to the READY status after PASS judgment. However, if the PASS HOLD is activated, PASS judgment will persist until the set duration of PASS HOLD is fully met. Refer to page 62 for details.

In addition, pressing the STOP button during the set duration of PASS HOLD can return to READY status immediately.
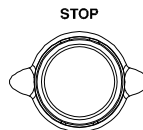
![Note](/) Note	The buzzer will only sound if the Buzzer is set to ON. See page 118 for details.
	The START button is disabled when the buzzer is beeping.

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

ACW PASS Timing
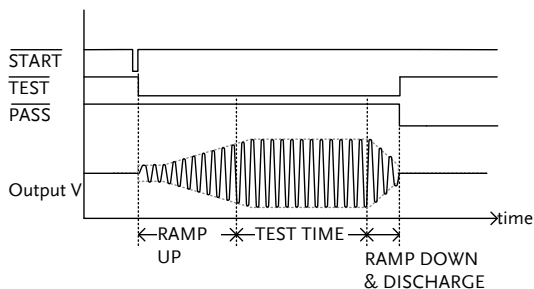
DCW PASS
Timing
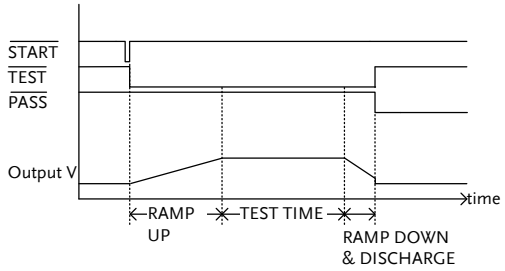
IR PASS Timing
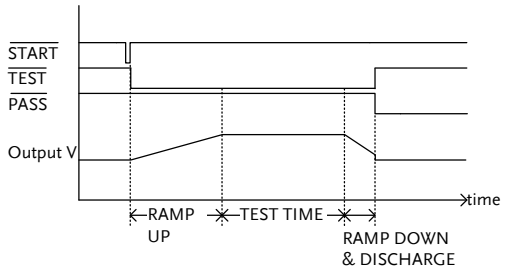
GB PASS Timing
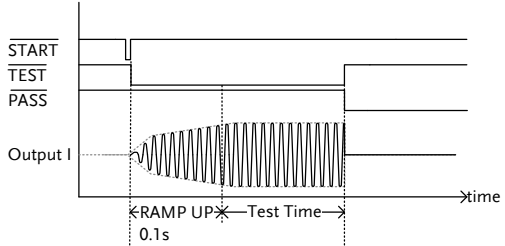
CONT PASS
Timing
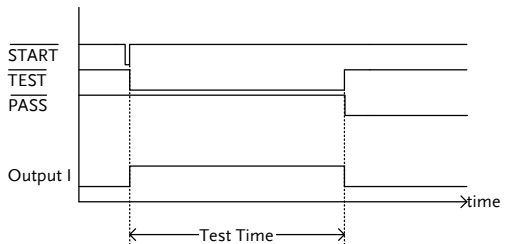
FAIL Judgment   1. When the test is judged as FAIL, FAIL will be displayed on screen, the buzzer will sound and the FAIL indicator will be lit red.

FAIL

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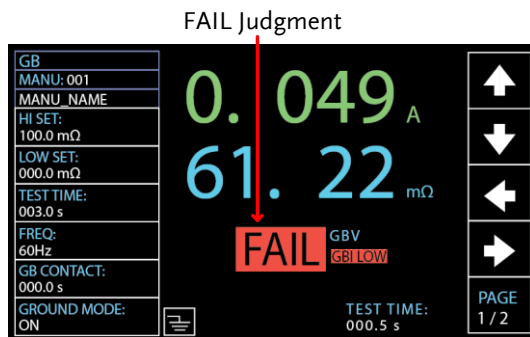
FAIL Judgment

2. The FAIL judgment will be held on the display until the STOP button is pressed. Pressing the STOP button will return the tester back to the READY status.

STOP

⚠ Note
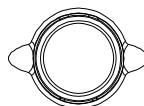
The buzzer will only sound if Fail Sound is set to ON. See page 118 for details.

FAIL Timing Diagrams

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

ACW FAIL Timing

START
TEST
FAIL

Output V

←RAMP — ⁕—TEST TIME —⁕—→
UP   DISCHARGE

time

DCW FAIL Timing

START
TEST
FAIL

Output V

←RAMP —⁕—TEST TIME —⁕—→
UP   DISCHARGE

time

IR FAIL Timing

START
TEST
FAIL

Output V

←RAMP —⁕—TEST TIME —⁕—→
UP   DISCHARGE
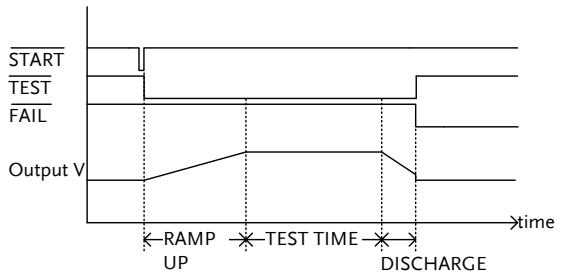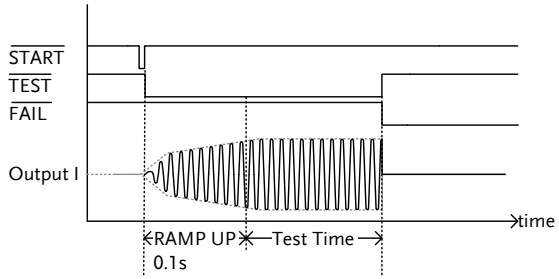
time

GB FAIL Timing

CONT FAIL
Timing
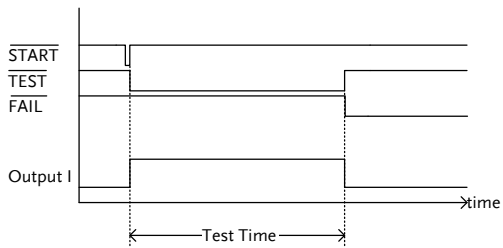
Special MANU Test Mode (000)

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 status, unlike under normal operation.

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

Steps

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

2. The settings of a previous test can be loaded by pressing the corresponding soft-keys on the front panel.

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

ACW

DCW

IR

GB

CONT

3. Set all the necessary parameters for a test and save.

Note: A different test setup can be saved for each test function (ACW, DCW, IR, GB and CONT). Below is an example of ACW function in special manual mode.

Special MANU Number 000
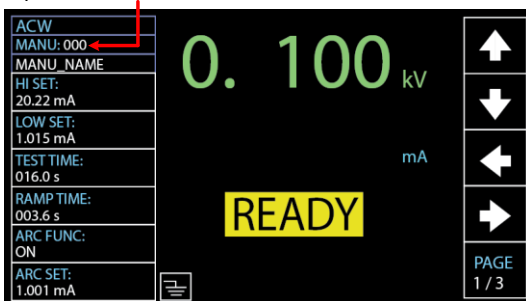
Running the Test 1. In special test mode (000), tests are started and stopped in the same way as for the normal manual test mode. See page 76 for details.

2. If required, the scroll wheel can be used to set the voltage level in real-time as the test is running under either ACW or DCW mode.

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.

Sweep Function

Sweep Function
Overview

The GPT-10000 Series has access to the sweep mode function, which creates a graph of one of the ACW, DCW, IR, GB or CONT tests in either Manual test or the special MANU 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 fetched and 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.
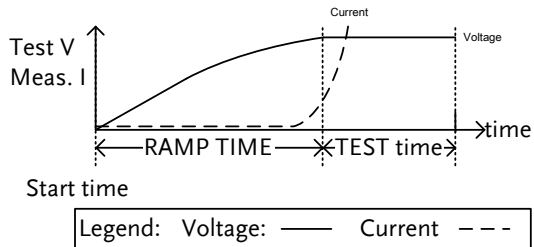
The test items that are plotted on the sweep graph depend on the type of test that is performed.

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)
CONT	Test current, measured resistance (I, R)

Steps of View
Sweep Graph

1. When a test has finished, press
    the corresponding button, e.g.,
    DCW button for DCW test, to
    view the result of the sweep in
    an intuitive graph.
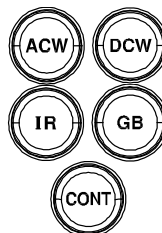
	Graph Test Items:	
TEST	GREEN	BLUE
ACW	Test voltage	Test current
DCW	Test voltage	Test current
IR	Test voltage	Test resistance
GB	Test current	Test resistance
CONT	Test current	Test resistance

DCW Sweep
Graph Example
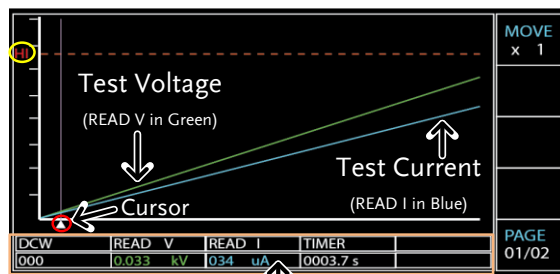
The values of point by cursor

2. Use the scroll wheel to move the cursor on the time axis (red highlight in x-axis). The measured values on the green and blue lines at that particular point in time are shown within the table below (orange highlight). Also, the test function along with the test number is clearly shown within the table. The HI in y-axis (yellow highlight) along with the dotted line in red indicates the HI SET value and the point of tripped time.

Turn Pages

3. The resultant graph will be over 1 page when test time is beyond 650 steps (the interval of each step is 0.1s). In this case, press PAGE soft-key to switch among each page for full graphs.

PAGE
01/02
PAGE
02/02
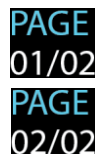
Fast-forward

4. Press the MOVE soft-key before moving the cursor to fast-forward steps by 10 times (x 10), which is practical when steps are many. Press the MOVE soft-key again to return back to the normal "x 1" speed.

MOVE
x 1
MOVE
x 10

Exit the Results Graph

To exit the sweep graph, press the corresponding button again to return back to Manual test.
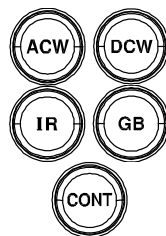
Automatic Tests

This section describes how to create, edit and run automatic tests. Automatic tests allow you to link up to 10 different MANU tests and run them sequentially within a single AUTO test. Each stored MANU test is used as a test step when creating an AUTO test. In addition, up to 5 groups of AUTO test can be interconnected together to present an ever-advanced AUTO tests.

Before operating the GPT-12000 please read the safety precautions as outlined in the Set Up chapter on page 21.

Choose/Recall an AUTO Test

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

                      Up to 100 automatic tests can be saved or
                      recalled.

Steps   1. If the tester is in MANU or   ┌─────────┐
                 SYSTEM mode, press the AUTO   │ AUTO   │
                 key on the front panel. This will   └─────────┘
                 put the tester into Auto mode.

             2. After entering the AUTO mode,
                 first use the scroll wheel to choose
                 the AUTO number.

                 AUTO #   001~100

                 AUTO number cursor   READY status

⚠ Note   The AUTO number can only be chosen
                    in READY status. If the status is either
                    PASS or FAIL, press the STOP button
                    to restore back to the READY status.
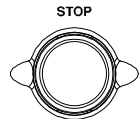
Creating an AUTO Test File Name

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

Steps   1.   Use the LEFT/RIGHT arrow soft-
                   keys to move the cursor to the
                   AUTO_NAME (default name) field.
                   The characters table will appear in
                   the right hand accordingly.

                   AUTO name cursor   Character Table

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

              3.   Press the LEFT / RIGHT arrow soft-
                   keys to move the cursor 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   Neither number (0 – 9) nor underline (_) can be set for the 1st character in AUTO test file name.

Adding a Step to the AUTO Test

Background   Up to 10 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 key to bring the cursor to the MANU STEP number.

MANU STEP number cursor

2. Use the scroll wheel to choose a MANU STEP number to add to the automatic test.

MANU STEP number   001~100, CON

CON   It indicates that this group of AUTO test can be connected with the next group. Refer to page 97 for more details.

95

3. Further press the DOWN arrow
   key followed by using the scroll
   wheel to choose another MANU
   STEP number to add to the
   automatic test.

MANU STEP number cursor (2nd)

AUTO-001		AUTO_NAME			READY	
MANU STEP	TEST MODE	V/I SETTING	HI SETTING	LOW SETTING	STEP HOLD	
001	DCW	0.100kV	1.000mA	000 uA	P.C/F.C	
002	ACW	0.100kV	1.000mA	000 uA	P.C/F.C	
						SKIP
						DEL.
						STEP HOLD

4. Repeat the previous steps for any other MANU
   tests that you wish to add to the automatic test.

Continuous AUTO Tests

Background   As mentioned previously, up to 10 MANU
                    steps can be grouped to form an AUTO test and
                    user can designate each step from MANU step
                    number 1 to 100 for an AUTO test. However, it
                    is available to interconnect different AUTO
                    tests together to present a series of AUTO tests.

Steps   1. Follow the steps of "Adding a Step to the
                  AUTO Test" in page 95 first. See the example
                  below where 5 MANU steps have been
                  added into the AUTO-001 group.

               2. Press the DOWN arrow key to
                  bring the cursor to the next MANU
                  STEP field followed by using the
                  scroll wheel to choose CON from
                  the MANU STEP options.

CON is chosen from MENU STEP

3. Repeat the step 1 to form another group of AUTO-002 test as the following display shown.

AUTO-002 comprising 3 MANU steps

4. After the previous steps, return to the AUTO-001 test page followed by pressing START button for automatic test. The AUTO-002 test will ensue from the end of AUTO-001 test. The continuous AUTO tests are thus established perfectly.
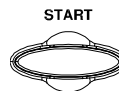
⚠ Note

• Up to 5 groups of AUTO tests can be interconnected. The former 4 groups of AUTO tests, due to CON occupation, owns up to 9 MANU steps, respectively, whereas the last group can own up to 10 MANU steps. Thus, it is 46 MANU steps at the maximum for a continuously interconnected AUTO test.

• The interconnected groups of AUTO test are limited in serial numbers. That is to say, when initializing from AUTO-005, for example, the next group will be definitely AUTO-006 followed by AUTO-007, if available, and so forth up to 5 groups.

AUTO Test Page Editing

Background	The AUTO test page contains each added MANU step (up to 10 steps) in order on the list along with the corresponding settings including Test Mode, Test V/I Setting, HI & LOW Settings as well as Step Hold action, respectively. Each step can be skipped, deleted or edited for its Step Hold actions.

Skip a MANU STEP	1. Press the UP / DOWN arrow soft-keys to bring the cursor to the target MANU STEP on list.

Target MANU STEP cursor

2. Press the SKIP soft-key.

3. The designated MANU STEP will be grayed out in color of setting.

The gray-out MANU STEP

⚠ Note	When the AUTO test is run next time, the grayed-out steps will be simply skipped.

Delete a MANU STEP

1. Press the UP / DOWN arrow soft-keys to bring the cursor to the target MANU STEP on list.

Target MANU STEP cursor

2. Press the DEL. soft-key.

3. The designated MANU STEP will be deleted from the list.

The designated MENU STEP is removed

AUTO-001		AUTO_NAME			READY	
MANU STEP	TEST MODE	V/I SETTING	HI SETTING	LOW SETTING	STEP HOLD	⬆
001	DCW	0.100kV	1.000mA	000 uA	P.C/F.C	⬇
						SKIP
						DEL.
						STEP HOLD

Step Hold Editing

1. Press the UP / DOWN arrow soft-keys to bring the cursor to the target MANU STEP on list.

Target MANU STEP cursor

AUTO-001		AUTO_NAME			READY	
MANU STEP	TEST MODE	V/I SETTING	HI SETTING	LOW SETTING	STEP HOLD	⬆
001	DCW	0.100kV	1.000mA	000 uA	P.C/F.C	⬇
002	ACW	0.100kV	1.000mA	000 uA	P.C/F.C	
						SKIP
						DEL.
						STEP HOLD

2. Press the STEP HOLD soft-key to bring the cursor to the STEP HOLD setting field.

STEP HOLD

STEP HOLD cursor

3. Use the scroll wheel to choose the options from STEP HOLD setting as listed below.

P.H/F.H   Step which is judged PASS will be held until START button pressed by user for next step. Step which is judged FAIL will be held until START button pressed by user for next step.

P.H/F.S   Step which is judged PASS will be held until START button pressed by user for next step. The AUTO test will be immediately stopped when Step is judged FAIL.

P.H/F.C   Step which is judged PASS will be held until START button pressed by user for next step. The AUTO test will automatically continue although the step is judged FAIL.

P.C/F.H   The AUTO test will automatically
                continue when the step is judged
                PASS. Step which is judged FAIL
                will be held until START button
                pressed by user for next step.

P.C/F.S   The AUTO test will automatically
                continue when the step is judged
                PASS. The AUTO test will be
                immediately stopped when step
                is judged FAIL.

P.C/F.C   The AUTO test will automatically
                continue when the step is judged
                PASS. The AUTO test will
                automatically continue although
                the step is judged FAIL.

0.1 ~ 999.9 s   The step will be held for specified
                seconds (0.1 ~ 999.9s) until the
                next step, regardless of PASS or
                FAIL judgment.

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 149).

- 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 READY status for the AUTO test to come.	Page 93

READY status indicator

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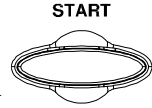
START

3. Each test will start by showing the ongoing
    ramp up time followed by the ongoing test time
    and the ongoing ramp down time. Each test
    will be tested in sequence until the last test has
    finished or the test is stopped.

⚠ Note   RAMP DOWN time only appears when user
          has activated it. See page 48 for details.

PASS & FAIL HOLD

1. If P.H (Pass Hold) or F.H (Fail Hold) is set for a MANU STEP, then the tester will "hold" the testing when a PASS or FAIL judgment for that particular MANU STEP occurs. See page 102 for more details.

PASS HOLD Indicator
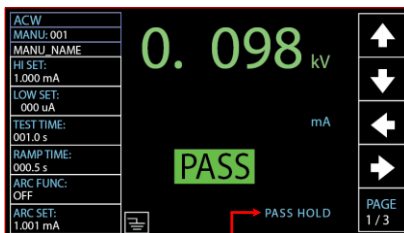
PASS HOLD indicator

FAIL HOLD Indicator
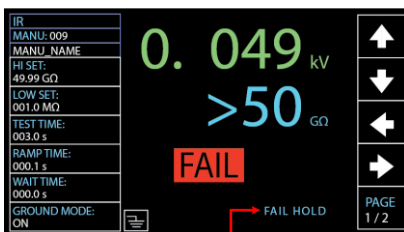
FAIL HOLD indicator

2. The PASS or FAIL indicator on the front panel will also be lit. The buzzer will sound when activated.

3. To continue to the next MANU STEP after HOLD is displayed on-screen, press the START button.
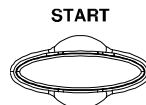
4. To stop the whole AUTO test when HOLD is displayed on-screen, press the STOP button.
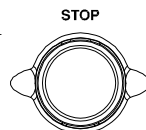
⚠ Note   When in HOLD status, only the START and STOP buttons can be pressed, all other keys are disabled.

FAIL STOP

1. If F.S (Fail Stop) is set for a MANU STEP, then the tester will "Stop" the whole AUTO test immediately when a FAIL judgment for that particular MANU STEP occurs. See page 103 for more details.

FAIL STOP Setting

MANU STEP	TEST MODE	V/I SETTING	HI SETTING	LOW SETTING	STEP HOLD
001	DCW	0.100kV	1.000mA	000 uA	P.C/F.C
002	ACW	0.100kV	1.000mA	000 uA	P.C/F.C
026	IR	0.150kV	069.8MΩ	000.6MΩ	P.C/F.S
001	DCW	0.100kV	1.000mA	000 uA	P.C/F.C
002	ACW	0.100kV	1.000mA	000 uA	P.C/F.C

FAIL STOP setting

FAIL HOLD Result Indicator

AUTO test stops in FAIL status

MANU STEP	TEST MODE	READ DATA1	READ DATA2	TEST TIME	TEST RESULT
001	DCW	0.099kV	000 uA	T000.3s	PASS
002	ACW	0.099kV	000 uA	T000.3s	PASS
026	IR	0.049kV	60.00GΩ	T000.3s	FAIL
001	DCW	0.000kV	000 uA	I000.0s	
002	ACW	0.100kV	000 uA	I000.0s	

FAIL STOP indicator on exact MANU STEP

2. The FAIL indicator on the front panel will also be lit. The buzzer will sound when activated.

FAIL

3. When FAIL is displayed on-screen, press the STOP button twice to return to the READY status.

STOP
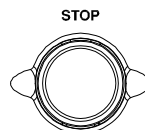
Return to READY status

Restore to READY status

⚠ Note

When in FAIL status, only the STOP button 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.
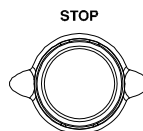
   STOP

   All panel keys except the STOP and START buttons are disabled when the tester has been stopped. All the results up until when the AUTO test was stopped are shown on-screen. See page 110 for more details on automatic test results.

   Below is example of an automatic test that has been stopped in the midway. The remaining MANU STEPs are aborted without test results.

AUTO test stops

The exact stopped MANU STEP

2. To put the tester back into READY
    status, press the STOP button
    again.

STOP

Restore to READY status

3. Or press the START button to
    restart the AUTO TEST again
    directly.

START

⚠ Note

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

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

AUTO TEST result indicator

MANU STEP results indicators

⚠ Note

The PASS/FAIL/STOP result shown on the top-right corner for an AUTO TEST as a whole depends on the results of all the steps (MANU STEPs) that compose an AUTO TEST:

If Interlock function is enabled but without interlock inserted into Signal I/O port, the Interlock Open message will be shown on top-right corner and AUTO test will be unable to start. Refer to page 130 for details.

PASS Judgment

Each MANU STEP must be passed to present a PASS judgment on an AUTO TEST. (Excluding skipped MANU STEPs in gray color).

PASS

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

AUTO TEST PASS judgment

All MANU STEPs with PASS results

⚠ Note

The Buzzer setting must to set to ON for the buzzer to sound (page 119).

FAIL Judgment

A FAIL result from a single MANU STEP will result in FAIL judgment for the whole AUTO TEST.

FAIL

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

AUTO TEST FAIL judgment

One of the MANU STEPs with FAIL result

| ⚠ Note | The Buzzer setting must to set to ON for the buzzer to sound (page 119). |

| STOP Result | Once a MANU STEP is stopped, the AUTO TEST will be presented STOP in its result. In other words, if a MANU STEP is stopped, the entire AUTO TEST is in STOP result, neither PASS nor FAIL judgment. And the remaining MANU STEP(s) will be ignored with blank in test result field. |

AUTO TEST STOP result

One of the MANU STEPS was stopped

| ⚠ Note | The Buzzer setting must to set to ON for the buzzer to sound (page 119). |

Steps of
Viewing Results

1. When an AUTO TEST is finished, the detailed test results along with values of each MANU STEP will be presented within the resultant table. The Read Data1 indicates the actual test V/I. The Read Data2 refers to the measured I/R. The Test Time simply means the set test time for MANU STEP.

Test results & values of each MANU STEP

2. Turn the scroll wheel right to flip page for checking parameter settings of each MANU STEP in table. Turn left to return back to previous page.

on parameters including Step Hold, Test Mode, Test V/I Setting and HI & LOW Settings.

Parameter settings of each MANU STEP

⚠ Note

Press STOP button before turning the scroll wheel right when FAIL judgment of AUTO TEST occurs.

Return to Ready Status	1. The PASS/FAIL/STOP results will be held on the screen until the STOP button is pressed.
	2. To put the tester back into READY status, simply press the STOP button (twice for a FAIL result).
	3. The READY indicator will be shown on the top of display.

READY status indicator

| Check Multiple Pages of Results | The tester is able to interconnect up to 5 groups of AUTO TESTs and present a result of multiple pages. In this case, it is available to toggle between pages for checking. Refer to page 97 for how to organize a continuous AUTO TEST. |

| Steps | 1. After a continuous AUTO TEST is completed, press PAGE soft key on the front panel to flip among different pages |

| Test Result of Page 1/2 | |

Multiple Pages indicator - 1/2

Test Result of
Page 2/2

AUTO:002		AUTO_NAME			FAIL	
MANU STEP	TEST MODE	READ DATA1	READ DATA2	TEST TIME	TEST RESULT	
001	DCW	0.099kV	000 uA	T000.3s	PASS	
002	ACW	0.099kV	000 uA	T000.3s	PASS	
					PAGE 2/2	

Multiple Pages indicator - 2/2

2. The test results in multiple pages of continuous AUTO TEST are almost identical with that of single AUTO TEST. Refer to page 110 to 113 for details on checking test results.

PASS Timing
Diagram

FAIL Timing
Diagram

System Settings

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

The System menu includes the following settings:

- Display Set settings → from page 117.
- Buzzer Settings → from page119.
- Interface Settings → from page 121.
- Control settings → from page 123.
- System Time settings → from page 131.
- Data Initialize settings → from page 135.
- Information section → from page 138.
- Statistics settings → from page 139.
- USB Disk settings → from page 141.

Display Set Setting

Description   The Display Set page includes both brightness
                     level and language settings.

Steps   1. Press the SYSTEM button on the   [SYSTEM]
                   front panel when the tester is
                   under READY status in either
                   MANU or AUTO test.

               2. The SYSTEM page will be shown   ENTER
                   where DISPLAY SET is on top of
                   the left-side list. Press the ENTER
                   soft-key to enter the setting page.

               3. Use the scroll wheel to set the
                   Brightness level.

               LCD Brightness   1 bar (low) ~ 10 bars (high)

4. Press the UP/DOWN arrow soft-keys to move the cursor to the Language setting followed by using the scroll wheel to set the options of Language setting.

DISPLAY SET:	Brightness:	
BUZZER:	Language: ENGLISH	
INTERFACE:		
CONTROL:		
SYSTEM TIME:		
DATA INIT:		
INFORMATION:		
STASTISTICS:		
USB DISK		
		EXIT

Language   English
options
            繁體中文 (Traditional Chinese)

            简体中文 (Simplified Chinese)

5. Press the EXIT soft-key to exit from the DISPLAY SET page.   **EXIT**

⚠ Note
- The changes in DISPLAY SET are saved instantly.
- The AUTO or MANUAL button can be pressed at any time to jump to its belonging page, individually. Alternatively, it is available to promptly return back to the previous page with settings, whether it's AUTO or MANUAL mode, by simply pressing SYSTEM button.

Buzzer Settings

Description   The Buzzer settings allow you to set whether
                        the Buzzer will sound for PASS/FAIL
                        judgments. Also, it is available to set Key
                        Sound for buttons being pressed.

Steps   1.   Press the SYSTEM button on the
                        front panel when the tester is   **SYSTEM**
                        under READY status in either
                        MANU or AUTO test.

                   2.   The SYSTEM page will be shown.
                        Press the UP/DOWN arrow soft-
                        keys to move the cursor to the
                        BUZZER setting.
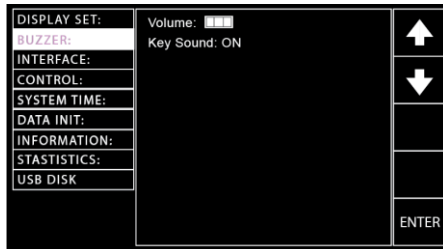
                   3.   Press the ENTER soft-key to enter
                        the Volume setting followed by   **ENTER**
                        using the scroll wheel to set the
                        Volume level.
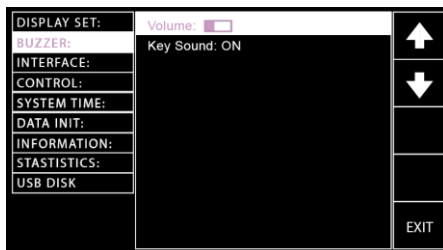
Buzzer Volume   1 bar (low) ~ 3 bars (high)

4. Press the UP/DOWN arrow soft-keys to move the cursor to the Key Sound setting followed by using the scroll wheel to set the Key Sound setting.
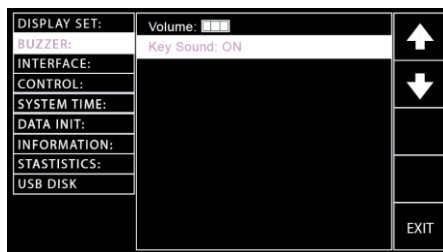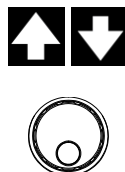
Key Sound   ON, OFF

5. Press the EXIT soft-key to exit from the BUZZER page.

⚠ Note | When in the AUTO test, the Buzzer sound only applies to the overall judgment of an AUTO test. There will no Buzzer sound for judgment of each test step within a group of an AUTO test.

⚠ Note | The changes in BUZZER setting are saved instantly.

Interface Settings

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

Steps

1. Press the SYSTEM button on the front panel when the tester is under READY status in either MANU or AUTO test.

   SYSTEM

2. The SYSTEM page will be shown. Press the UP/DOWN arrow soft-keys to move the cursor to the INTERFACE setting.

   DISPLAY SET:
   BUZZER:
   INTERFACE:
   CONTROL:
   SYSTEM TIME:
   DATA INIT:
   INFORMATION:
   STASTISTICS:
   USB DISK

   Interface: GPIB
   Address: 00

   ENTER

3. Press the ENTER soft-key to enter the Interface setting followed by using the scroll wheel to select the Interface options.

   ENTER

   DISPLAY SET:
   BUZZER:
   INTERFACE:
   CONTROL:
   SYSTEM TIME:
   DATA INIT:
   INFORMATION:
   STASTISTICS:
   USB DISK

   Interface: GPIB
   Address: 00

   EXIT

   Interface Options   RS-232, USB, GPIB

4. When RS-232 is selected, press the UP/DOWN arrow soft-keys to move the cursor to the Baud Rate setting followed by using the scroll wheel to set the Baud Rate setting.
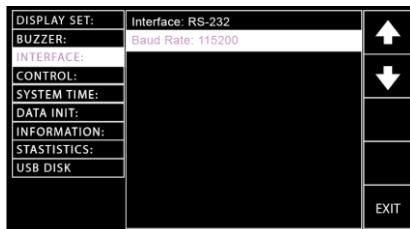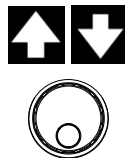
Baud Rate Setting for RS-232	9600, 19200, 38400, 57600, 115200,

5. When GPIB is selected, press the UP/DOWN arrow soft-keys to move the cursor to the Address setting followed by using the scroll wheel to set the Address setting.
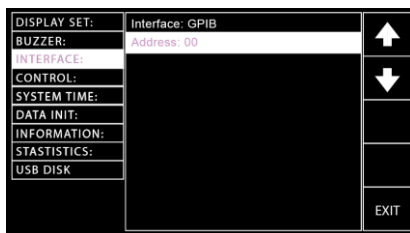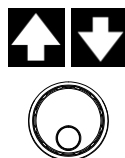
Address Setting for GPIB	00~31

6. Press the EXIT soft-key to exit from the INTERFACE page.

⚠ Note	Ensure the baud rate settings or GPIB address matches the host machine.
⚠ Note	The changes in INTERFACE setting are saved instantly.

Control Settings

Description

The Control settings include 6 options: Control By, Double Action, Key Lock, Interlock, Start Click For 1 Second, and Power GND Check.

- Control By 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 START & STOP buttons required for testing are not disabled. Also, the SYSTEM button remains functional for user to return back to the system setting.

- 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 150 for details.

- The Start Click For 1 Second indicates another safety feature that requires the START button being pressed for 1 second so that a test, whether MANU or AUTO, can be started.

- The Power GND Check detects if the ground terminal from power cord of instrument connects to earth ground properly.

Steps

1. Press the SYSTEM button on the front panel when the tester is under READY status in either MANU or AUTO test.

SYSTEM

2. The SYSTEM page will be shown. Press the UP/DOWN arrow soft-keys to move the cursor to the CONTROL setting.

DISPLAY SET:	Control By: Front Panel
BUZZER:	Double Action: OFF
INTERFACE:	Key Lock: ON
CONTROL:	Interlock: OFF
SYSTEM TIME:	Start Click For 1 Second: OFF
DATA INIT:	Power GND check: ON
INFORMATION:	
STASTISTICS:	
USB DISK	
	EXIT
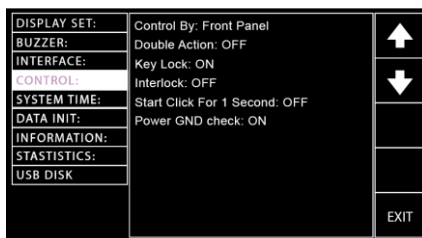
3. Press the ENTER soft-key to enter the Control By setting followed by using the scroll wheel to select the following options.

ENTER

DISPLAY SET:	Control By: Front Panel
BUZZER:	Double Action: OFF
INTERFACE:	Key Lock: ON
CONTROL:	Interlock: OFF
SYSTEM TIME:	Start Click For 1 Second: OFF
DATA INIT:	Power GND check: ON
INFORMATION:	
STASTISTICS:	
USB DISK	
	EXIT

Control By settings	Front Panel
	Remote
	SIGNAL IO

When SIGNAL IO is selected, press
the PIN SET soft-key to enter the
specific setting page.

**PIN
SET**

DISPLAY SET:	Control By: SIGNAL IO	↑
BUZZER:	Double Action: OFF	
INTERFACE:	Key Lock: ON	↓
CONTROL:	Interlock: OFF	
SYSTEM TIME:	Start Click For 1 Second: OFF	PIN SET
DATA INIT:		
INFORMATION:		
STASTISTICS:		
USB DISK		EXIT
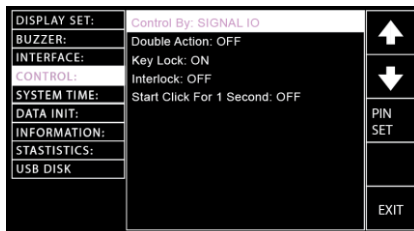
The setting page is divided into 2
sections; the upper is for output
pins settings, whilst the lower part
indicates the methods of Signal IO
selections under AUTO test mode.
Refer to the figure below.

SIGNAL IO Output PINs (green zone)

OUT1:READY	OUT2:TEST	OUT3:PASS	↑
OUT4:FAIL_H	OUT5:FAIL_L		↓
SIGNAL TO Selection AUTO			
TEST PIN STATUS	1 signal for all steps Step 1 ~ Step 10 test		
PASS & FAIL PIN STATUS	AUTO-STEP Step 1 Step 2 Step 3 OUTPUT-PASS OUTPUT-FAIL Enable		EXIT
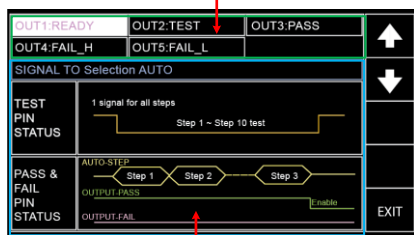
SIGNAL IO Selection for AUTO Test (blue zone)

Press the UP/DOWN arrow soft-
keys to move the cursor to target
PINs (1~5) followed by using the
scroll wheel to select the following
6 options for each pin.
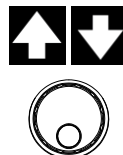
| PINs Settings | READY, TEST, PASS, FAIL, FAIL_H, FAIL_L |

Further press the UP/DOWN arrow soft-keys to move the cursor to the TEST PIN STATUS followed by using the scroll wheel to select the following 2 options for TEST PIN under AUTO test mode.

1 signal for all steps	It means one signal output of TEST PIN will be delivered to all steps all the way till the end of an AUTO test.
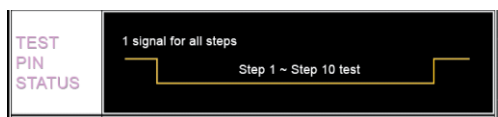
1 signal for each step	It means one signal output of TEST PIN will be delivered to each step with continuous counters within each interval between each step, which is particularly practical for certain applications.
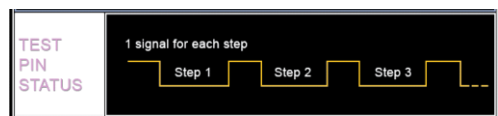
Further press the UP/DOWN arrow soft-keys to move the cursor to the PASS & FAIL PIN STATUS followed by using the scroll wheel to select the following 2 options for PASS & FAIL PINs under AUTO test mode.

Pass & Fail judgment in final step	Regardless of judgments of each step in an AUTO test, a PASS or FAIL will be given after the whole steps are completed. However, an AUTO test will be stopped in the mid way when F.C is activated. Refer to page 102 for details.

Pass & Fail judgment for each step	Pass or Fail judgment will be given for each step within an AUTO test. By doing so, the judgments of each step can be concretely recognized, individually for user.
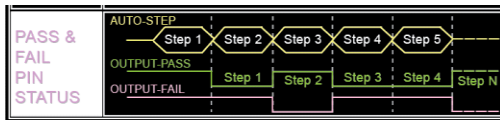
4. Press the UP/DOWN arrow soft-keys to move the cursor to the Double Action setting followed by using the scroll wheel to set the Double Action setting.
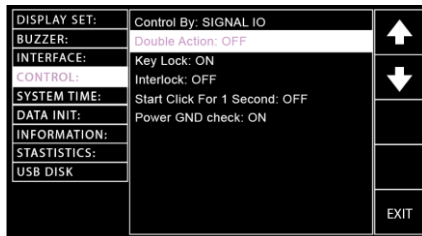
Double Action settings   ON, OFF

5. Press the UP/DOWN arrow soft-
    keys to move the cursor to the Key
    Lock setting followed by using the
    scroll wheel to set the Key Lock
    setting.

DISPLAY SET:	Control By: SIGNAL IO	
BUZZER:	Double Action: OFF	
INTERFACE:	Key Lock: ON	
CONTROL:	Interlock: OFF	
SYSTEM TIME:	Start Click For 1 Second: OFF	
DATA INIT:	Power GND check: ON	
INFORMATION:		
STASTISTICS:		
USB DISK		
		EXIT
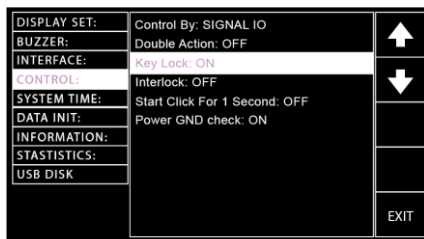
Key Lock settings   ON, OFF

6. Press the UP/DOWN arrow soft-
    keys to move the cursor to the
    Interlock setting followed by using
    the scroll wheel to set the Interlock
    setting.

DISPLAY SET:	Control By: SIGNAL IO	
BUZZER:	Double Action: OFF	
INTERFACE:	Key Lock: ON	
CONTROL:	Interlock: OFF	
SYSTEM TIME:	Start Click For 1 Second: OFF	
DATA INIT:	Power GND check: ON	
INFORMATION:		
STASTISTICS:		
USB DISK		
		EXIT
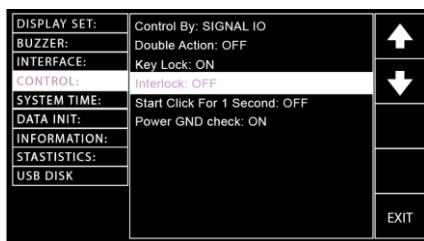
Interlock settings   ON, OFF

7. Press the UP/DOWN arrow soft-
    keys to move the cursor to the Start
    Click For 1 Second setting followed
    by using the scroll wheel to set the
    Start Click For 1 Second setting.
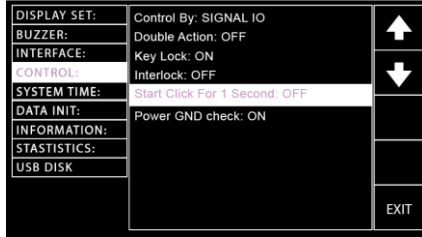
Start Click For 1 Second settings   ON, OFF

8. Press the UP/DOWN arrow soft-
   keys to move the cursor to the
   Power GND Check setting followed
   by using the scroll wheel to set the
   Power GND Check setting.
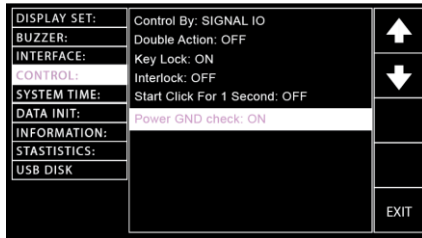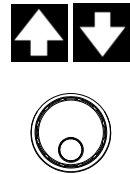
Power GND Check settings   ON, OFF

When Power GND Check setting is ON but the
instrument doesn't connect to earth ground, the
prompt message will appear in either MANU or
AUTO mode as the figures below shown.

MANU
MODE

POWER GND FAIL Message

AUTO
MODE

GND FAIL Message

9. Press the EXIT soft-key to exit from the CONTROL page.

EXIT

⚠ Note | The changes in CONTROL setting are saved instantly.

⚠ Note | The Double Action setting is ignored when the GPT-12000 is being controlled remotely via the USB, RS232 or GPIB interface.

⚠ 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, whether in MANU or AUTO test, to prevent the test from starting for safety reason.

MANU
Test

Interlock Open Message

AUTO
Test

Interlock Open Message

System Time Settings

Description	The date and time for tester system can be edited under this section. The button cell battery used for system date & time has the lifecycle of approximate 2 years in general. Hence, it is suggested to replace with new battery of the type of CR-2032 every 2 years.

Steps

1. Press the SYSTEM button on the front panel when the tester is under READY status in either MANU or AUTO test.

    [**SYSTEM**]

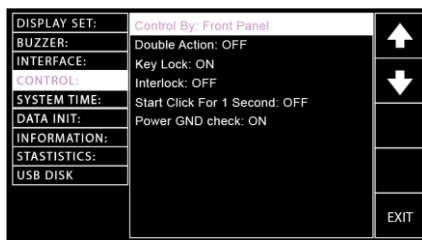2. The SYSTEM page will be shown. Press the UP/DOWN arrow soft-keys to move the cursor to the SYSTEM TIME setting.

    ⬆⬇

DISPLAY SET:	Year: 2019	
BUZZER:	Month: 04	⬆
INTERFACE:	Date: 02	
CONTROL:	Hours: 19	⬇
SYSTEM TIME:	Minutes: 08	
DATA INIT:	Seconds: 52	
INFORMATION:		
STASTISTICS:		
USB DISK		ENTER

3. Press the ENTER soft-key to enter the Year setting followed by using the scroll wheel to select the Year setting for system.

    ENTER

Year settings 2000 ~ 2099

4. Press the UP/DOWN arrow soft-
keys to move the cursor to the
Month setting followed by using
the scroll wheel to set the Month
setting for system.
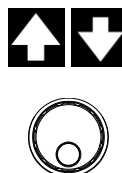
Month settings 01 ~ 12

5. Press the UP/DOWN arrow soft-
keys to move the cursor to the Date
setting followed by using the scroll
wheel to set the Date setting for
system.
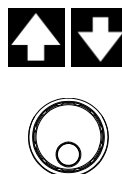
Date settings   01 ~ 31

6. Press the UP/DOWN arrow soft-
   keys to move the cursor to the
   Hours setting followed by using
   the scroll wheel to set the Hours
   setting for system.
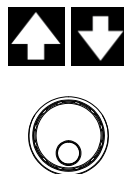
Hours settings   00 ~ 23

7. Press the UP/DOWN arrow soft-
   keys to move the cursor to the
   Minutes setting followed by using
   the scroll wheel to set the Minutes
   setting for system.
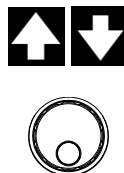
Minutes settings   00 ~ 59

8. Press the UP/DOWN arrow soft-
    keys to move the cursor to the
    Seconds setting followed by using
    the scroll wheel to set the Seconds
    setting for system.
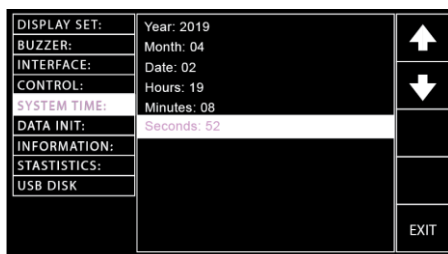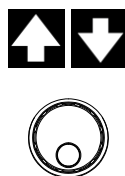
Seconds settings   00 ~ 59

9. Press the EXIT soft-key to exit from   EXIT
    the SYSTEM TIME page.

⚠ Note   The changes in SYSTEM TIME setting are saved
                instantly.

Data Initialize Settings

Description   The settings of AUTO test, MANU test and
               SYSTEM saved by user can be initialized within
               this section.

Steps   1. Press the SYSTEM button on the
             front panel when the tester is   [SYSTEM]
             under READY status in either
             MANU or AUTO test.

         2. The SYSTEM page will be shown.
             Press the UP/DOWN arrow soft-
             keys to move the cursor to the
             DATA INIT setting.
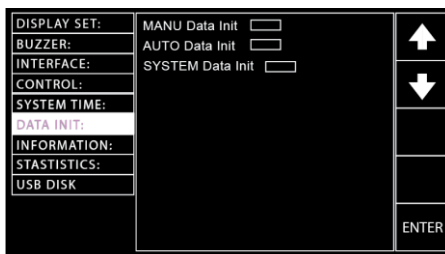
         3. Press the ENTER soft-key to enter   ENTER
             the Manu Data Init setting followed
             by pressing the right arrow soft-key
             for consecutive 3 times to initialize
             the Manu Data settings.

Right arrow soft-key
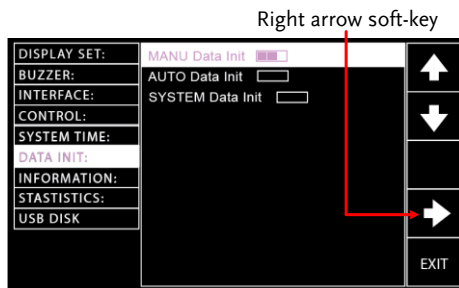
Note | The status bar of Manu Data Init consists of 3 bars, which indicate the initializing action will not be implemented until 3 bars are fully achieved. After the initializing, the "OK" message appears.

4. Press the UP/DOWN arrow soft-keys to move the cursor to the Auto Data Init setting followed by pressing the right arrow soft-key for consecutive 3 times to initialize the Auto Data settings.

Right arrow soft-key
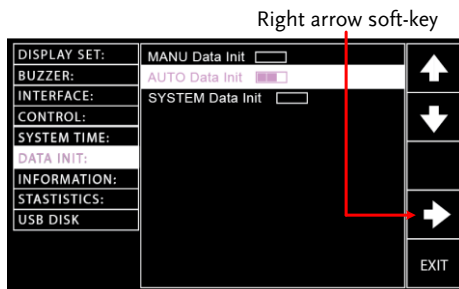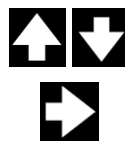
Note | The status bar of Auto Data Init consists of 3 bars, which indicate the initializing action will not be implemented until 3 bars are fully achieved. After the initializing, the "OK" message appears.

5. Press the UP/DOWN arrow soft-
    keys to move the cursor to the
    System Data Init setting followed
    by pressing the right arrow soft-key
    for consecutive 3 times to initialize
    the System Data settings.

Right arrow soft-key

DISPLAY SET:	MANU Data Init ☐	↑
BUZZER:	AUTO Data Init ☐	
INTERFACE:	SYSTEM Data Init ▮▮☐	↓
CONTROL:		
SYSTEM TIME:		
DATA INIT:		
INFORMATION:		→
STASTISTICS:		
USB DISK		EXIT
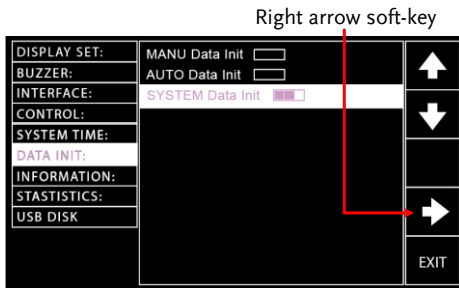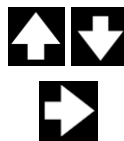
6. Press the EXIT soft-key to exit from
    the DATA INIT page.

    EXIT

⚠ Note

The status bar of System Data Init consists of 3
bars, which indicate the initializing action will not be
implemented until 3 bars are fully achieved. After
the initializing, the "OK" message appears.

Information Section

Description

The Information section here discloses some basic information including model name, firmware version and the available functions.

Steps

1. Press the SYSTEM button on the front panel when the tester is under READY status in either MANU or AUTO test.

   SYSTEM

2. The SYSTEM page will be shown. Press the UP/DOWN arrow soft-keys to move the cursor to the INFORMATION section.

3. The basic information of the tester will be clearly exposed on the screen.

Statistics Settings

Description	The settings of AUTO test, MANU test and SYSTEM saved by user can be initialized within this section.
Steps	1. Press the SYSTEM button on the front panel when the tester is under READY status in either MANU or AUTO test.

SYSTEM

2. The SYSTEM page will be shown. Press the UP/DOWN arrow soft-keys to move the cursor to the STATISTICS setting where PASS and FAIL amounts and TOTAL amounts to date are shown in the green highlight below. Also, the detailed distributions of PASS and FAIL amounts from each test functions are well disclosed for viewing in the blue highlight below.

PASS, FAIL amounts & TOTAL amounts

FUNCTION	PASS	FAIL
ACW	00003	00002
DCW	00003	00002
IR	00002	00003
GB	00003	00002
CONT	00012	00000

TOTAL AMOUNT = 00032
PASS AMOUNT = 00023
FAIL AMOUNT = 00009

DISPLAY SET:
BUZZER:
INTERFACE:
CONTROL:
SYSTEM TIME:
DATA INIT:
INFORMATION:
STASTISTICS:
USB DISK

ENTER

PASS & FAIL amounts
distributions in each test function

3. Press the ENTER soft-key to enter the statistics table. It is available to press the DATA INIT soft-key to initialize the accumulated statistics.

DISPLAY SET:	TOTAL AMOUNT = 00032		
BUZZER:	PASS AMOUNT = 00023		
INTERFACE:	FAIL AMOUNT = 00009		
CONTROL:	FUNCTION	PASS	FAIL
SYSTEM TIME:	ACW	00003	00002
DATA INIT:	DCW	00003	00002
INFORMATION:	IR	00002	00003
STASTISTICS:	GB	00003	00002
USB DISK	CONT	00012	00000

DATA INIT soft-key

⚠ Note

After pressing the DATA INIT soft-key, all the statistics shown on this page will be initialized to 0 and the future tests will be re-accumulated from zero.

4. Press the UP/DOWN arrow soft-keys to move the cursor to the table below. Place the cursor in target test function followed by pressing ANALY soft-key to enter the specific analysis page.

ANALY soft-key

DISPLAY SET:	TOTAL AMOUNT = 00032		
BUZZER:	PASS AMOUNT = 00023		
INTERFACE:	FAIL AMOUNT = 00009		
CONTROL:	FUNCTION	PASS	FAIL
SYSTEM TIME:	ACW	00003	00002
DATA INIT:	DCW	00003	00002
INFORMATION:	IR	00002	00003
STASTISTICS:	GB	00003	00002
USB DISK	CONT	00012	00000

Selected target test function

5. The distributions of PASS and FAIL statistics are well illustrated in the histogram with table display in which the upper side reads the individual PASS and FAIL amounts for test function. The mid and lower side depicts FAIL amounts in the far-right red strip with number below, whilst the PASS amounts are described in strips of different colors with numbers below indicating the percentage of varied measured values in relation to the set HI & LOW range.

IR	PASS = 00002		FAIL = 00003	

0~25%	26~50%	51~75%	76~100%	FAIL
00001	00000	00000	00001	00003
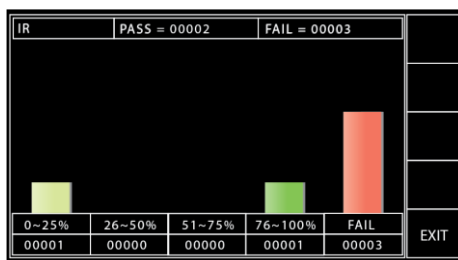
EXIT

6. Press the EXIT soft-key to exit from the STATISTICS page.

EXIT

USB Disk Settings

Description   The measurements data can be stored in the connected USB disk. In this section user can determine a user-defined name for data to be saved into the inserted USB disk. Refer to page 14 for details on USB port in the front panel.

Steps   1. Press the SYSTEM button on the front panel when the tester is under READY status in either MANU or AUTO test.

SYSTEM

2. The SYSTEM page will be shown. Press the UP/DOWN arrow soft-keys to move the cursor to the USB DISK setting.
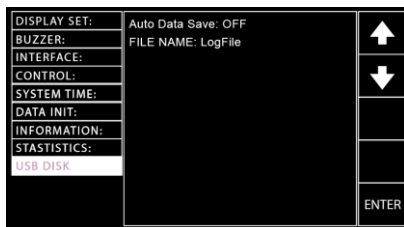
3. Press the ENTER soft-key to enter the Auto Data Save setting followed by using the scroll wheel to set the Auto Data Save setting.
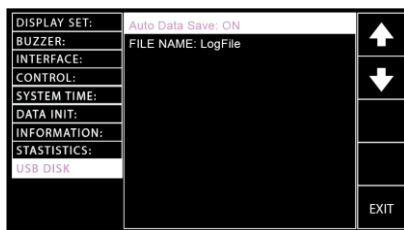
Auto Data Save setting   ON, OFF

4. Press the UP/DOWN arrow soft-keys to move the cursor to the File Name filed, which sets file name for Auto Data Save. The characters table will appear beneath accordingly.
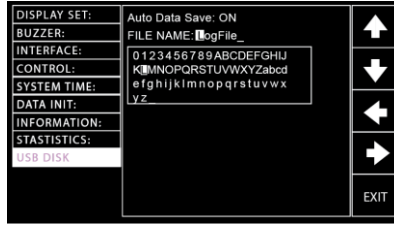
5. Use the scroll wheel to scroll through the available characters.

6. Press the LEFT / RIGHT arrow soft-keys to move the cursor to the next character.

7. The File Name is set when pressing the EXIT soft-key to exit from the USB DISK page.

⚠ Note   The changes in USB DISK setting are saved instantly.

Make sure an USB disk is plugged into GTP-10000 unit before saving measurement data into the disk. Once an USB disk is well inserted, the USB icon, in either MANU or AUTO mode, appears accordingly.

USB icon in MANU
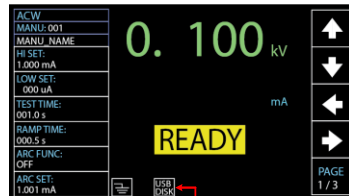
USB Disk Plugged in

USB icon in AUTO

USB Disk Plugged in
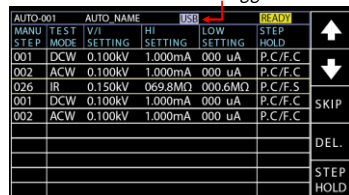
EXTERNAL CONTROL

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
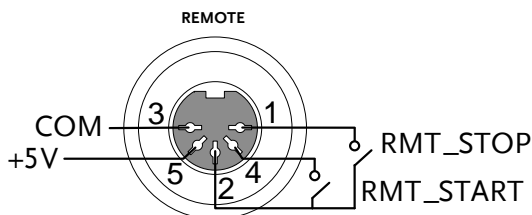
Pin	Pin name	Description
1	RMT_STOP	Remote Stop signal
2	COM	Common line
3	COM	Common line
4	RMT_START	Remote Start signal
5	+5V	+5V Output
Signal Properties		
High level input voltage	3.3V~5.0V	
Low level input voltage	0~0.8V	
Input period	minimum of 1ms	

Remote Controller Operation

Description   The GPT-12000 accepts external remote
                  controllers with a START and STOP button. To
                  use the REMOTE terminal, the GPT-12000 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   REMOTE
                 into the REMOTE terminal.
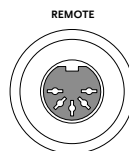
              2. Configure the CONTROL option to Page 123
                 REMOTE in the SYSTEM mode.

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

⚠ NOTE   Even if the GPT-12000 is configured to use the
              REMOTE option, the STOP button on the front
              panel can still be used to stop a test.

              4. To return the operation control to   Page 123
                 the front panel, configure the
                 CONTROL 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. Refer to page 150 for details.

                      The SIGNAL I/O port basically uses a DB-15
                      pin female connector.

Pin Assignment
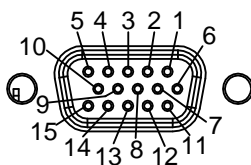
Pin name	Pin	Description
INTERLOCK1	1	When INTERLOCK is ON, a test is only allowed
INTERLOCK2	2	to start when both INTERLOCK pins are shorted.
INPUT_START	3	Start signal input
INPUT_STOP	4	Stop signal input
INPUT_COM	5	Common input line
NC	6	NC
OUTPUT_1	7	OUTPUT1 SIGNAL
OUTPUT_2	8	OUTPUT2 SIGNAL
OUTPUT_3	9	OUTPUT3 SIGNAL
OUTPUT_4	10	OUTPUT4 SIGNAL
OUTPUT_5	11	OUTPUT5 SIGNAL
NC	12	NC
NC	13	NC
NC	14	NC
OUTPUT_COM	15	Common output line

Interlock
connection

PIN 1 INTERLOCK1

PIN 2 INTERLOCK2

Input Connection

PIN 5 INPUT_COM
PIN 3 INPUT_START
PIN 4 INPUT_STOP

Output
Connection

PIN 7 OUTPUT 1
PIN 8 OUTPUT 2
PIN 9 OUTPUT 3
PIN 10 OUTPUT 4
PIN 11 OUTPUT 5
PIN 15 OUTPUT COM
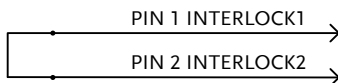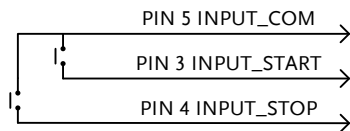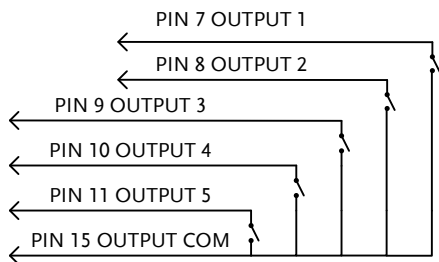
Signal Properties

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

Output Timing

OUTPUT 1
OUTPUT 2
OUTPUT 3
OUTPUT 4
OUTPUT 5
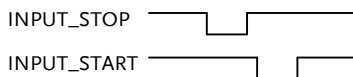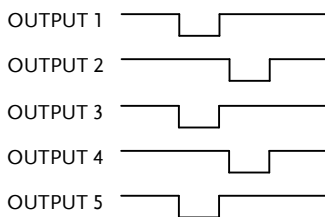
⚠ Note   Output is able to be deployed by programming.

Using the SIGNAL I/O to Start/Stop Tests

Background   To use the SIGNAL I/O port the CONTROL
                  settings have to be set to SIGNAL IO in the
                  SYSTEM mode.

Panel operation   1. Set the CONTROL option to   Page 122
                     SIGNAL IO in the SYSTEM mode.

                  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-12000 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 147 for the Signal I/O pin assignment.

Panel operation   1. Insert the Interlock key into the SIGNAL I/O port on the rear panel.
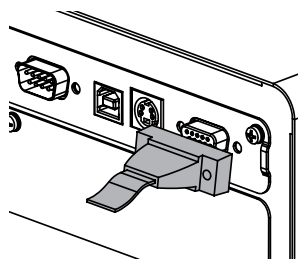
       2. Set the Interlock option to ON in the SYSTEM mode.   Page 123

⚠ Note   With INTERLOCK set to ON, the tester can now only start a test when the Interlock key is well 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-12000 side connector	Rear panel Type B
	USB Class	CDC (communications device class) (VCP, Virtual Com Port)

Panel operation	1. Connect the USB cable to the rear panel USB B-Type port.	
	2. Set the Interface to USB from the SYSTEM mode.	Page 120
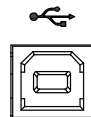
⚠ Note	When USB is used for remote control, an RS232 port is simulated. Check the Windows Device Manager for the baud rate and other RS232 settings. Check the RS232 configuration below for more details.
	Note the baud rate is fixed to 115200 baud when using the USB interface.

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
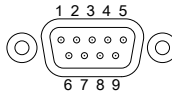
Pin Assignment		1: No connection
	1 2 3 4 5 6 7 8 9	2: RxD (Receive Data)
		3: TxD (Transmit Data)
		4: No connection
		5: GND
		6-9: No connection

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 RS-232 from the SYSTEM mode.	Page 120
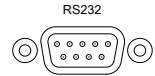
GPIB Remote Interface

GPIB Configuration	Address	0-31

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 SYSTEM mode.	Page 121

USB/RS232/GPIB Remote Control Function Check

Functionality
check

Invoke a terminal application such as RealTerm.

To check COM port number and other settings, see the Device Manager in PC. For WinXP; Control panel → System → Hardware tab.

Run this query command via the terminal after the instrument has been configured for USB, RS-232 or GPIB remote control.

*idn?

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

GPT-12004 ,GPT12000   ,T0.01I

Model number : GPT-12004

Serial number :8 characters serial number

Firmware version : T0.01I

CR, LF can be used as the terminal character when entering queries/commands from a terminal application. Refer to page 158 for details.

RMT Display

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

RMT indicator

Err Display   When an incorrect command is sent to the
                     tester, the Err indicator will be displayed on the
                     screen indicating there is an error in command.

Err indicator

Return to Panel Control

Background   When the instrument is remotely controlled all
                     panel keys except the STOP button are disabled.
                     Receive a stop signal from either mode of
                     Control By (Front Panel, Remote, SIGNAL IO),
                     while the RMT indicator is displayed, or simply
                     send a RMTOFF command (page 207) to return
                     the instrument back to the READY status.

⚠ Note   To put the tester back to the 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

Function Commands

Manual Commands

Auto Commands

Sweep Commands

Common Commands

Remote Commands

System Commands

SYSTem:LCD:BRIGhtness

Set ⟶
⟶ Query

Description	Sets the brightness of the LCD display from 1(dark) to 10(bright).
Syntax	SYSTem:LCD:BRIGhtness <NR1>
Query Syntax	SYSTem:LCD:BRIGhtness?
Parameter/ Return parameter	<NR1> 1 (dark) ~ 10 (bright)
Example	SYST:LCD:BRIG 10
	Sets the display brightness to the brightest 10.

SYSTem:BUZZer:VOLUME

Set ⟶
⟶ Query

Description	Sets buzzer volume from 1(low) to 3(high).
Syntax	SYSTem:BUZZer:VOLUME <NR1>
Query Syntax	SYSTem:BUZZer:VOLUME
Parameter/ Return parameter	<NR1> 1 (low) ~ 3 (high)
Example	SYST:BUZZ:VOLUME 3
	Sets the buzzer volume to the highest 3.

SYSTem:BUZZer:KEYSound

Note the Set and Query badges

Set ⟶

⟶ Query

Description	Turns the buzzer on or off for key sound.
Syntax	SYSTem:BUZZer:KEYSound {ON|OFF}
Query Syntax	SYSTem:BUZZer:KEYSound?
Parameter/ Return parameter	ON Buzzer Key Sound on. OFF Buzzer Key Sound off.
Example	SYST:BUZZ:KEYS ON
	Turns the buzzer on for key sound.

SYSTem:TIME

⟶ Query

Description	Queries the system time.
Query Syntax	SYSTem:TIME?
Return parameter	\<string\> Returns the system date & time as a string
Query Example	SYST:TIME?
	>2019-01-05 16:11:59

SYSTem:STATistics

⟶ Query

Description	Queries the latest statistics of PASS and FAIL.
Query Syntax	SYSTem:STATistics?
Return parameter	\<string\> Returns the latest statistics of all the function tests with counts of PASS and FAIL judgments respectively.

Query Example	SYST:STAT?
	>TOTAL AMOUNT=00071
	>PASS AMOUNT=00059
	>FAIL AMOUNT=00012
	>FUNC,PASS ,FAIL ,
	>ACW ,00026,00009,
	>DCW ,00000,00000,
	>IR ,00017,00003,
	>GB ,00000,00000,
	>CONT,00016,00000,

SYSTem:ANALysis   ➜ Query

Description	Queries the latest analysis of each test function.	
Query Syntax	SYSTem:ANALysis {ACW | DCW|IR|GB|CONT}	
Return parameter	<string>	Returns the latest analysis of the select test with PASS and FAIL judgments and distributions.
Query Example	SYST:ANAL IR	
	>IR,PASS=00017,FAIL=00003	
	>000~025%=00003	
	>026~050%=00000	
	>051~075%=00000	
	>076~100%=00014	
	>FAIL=00003	

Set ➜
SYSTem:USBDisk:AUTOsave   ➜ Query

Description	Sets the USB disk auto data save on or off.	
Syntax	SYSTem:USBDisk:AUTOsave {? | ON |OFF}	
Query Syntax	SYSTem:USBDisk:AUTOsave?	
Parameter	ON	Turns the USB disk auto save on.
	OFF	Turns the USB disk auto save off.
Return parameter	ON	USB disk auto save on.
	OFF	USB disk auto save off.

Example   SYST:USBD:AUTO ON

Turns USB disk auto save on.

SYSTem:USBDisk:DataSave   → Query

Description	Save the current data into the inserted USB disk.
Syntax	SYSTem:USBDisk:DataSave
Parameter	N/A	No parameter is required.
Example	SYST:USBD:DS
	The current data is saved into the inserted USB disk.

SYSTem:ERRor   → Query

Description	Returns error code of the previous error. 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
27,GBV > 7.2V
28,ARC <= HI Set
29,HI Set => ARC
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
41,WAIT Time Setting Error
42,RAMP Down Setting Error
43,PASS Hold Setting Error
44,GB Contact Setting Error
45,Setting Over 200W
46,CONT Setting Over 9V
47,Auto Step Add Full
48,This Is The Last Step
49,Auto Connect Set Error

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

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 (1-50) of the AUTO test.
		Return parameters: function, judgment/status, test voltage, test 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>1~50. MANU 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, CON
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?
	> CON,FAIL ,100.0mA,99.99 ohm,T=000.1S
	Returns the test result of the current MANU test.

Example (in AUTO mode)	MEAS21?
	> DCW,FAIL ,0.004kV, 000.0 uA ,T=000.3S
	Returns the step 21 of the current AUTO test 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.
Return parameter	AUTO	Puts the tester mode 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.
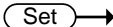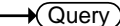
MANU:INITial

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, GB or CONT).
Syntax	MANU:INITial

Initial Settings

		Function				
Parameter		ACW	DCW	IR	GB	CONT
REF#		0.000uA	0.000mA	000.0MΩ	000.0mΩ	00.00Ω
FREQ		60Hz	X	X	60Hz	X
HI SET		1.000mA	1.000mA	∞GΩ	100.0mΩ	01.00Ω
LO SET		0.000mA	0.000mA	001.0MΩ	000.0mΩ	00.00Ω
I or V		V=0.100 kV	V=0.100 kV	V=0.050 kV	03.00A	100mA
TEST TIME		001.0S	001.0S	000.3S	000.3S	000.3s
RAMP TIME		000.1S	000.1S	000.1S	X	X

Example	MANU:INITial
	Loads the initial settings for the selected MANU number.

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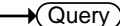
Description	Sets or returns the test name for the selected manual test. The test must be in MANU mode before this command can be used. Note only alphanumeric characters (A-Z, a-z, 0-9) and the "_" underscore character can be used to set the MANU test name.
Syntax	MANU:NAME <string>
Query Syntax	MANU:NAME?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

(Set) →
MANU:RTIMe   → (Query)

Description	Sets or returns the Ramp Time for the test in seconds. Note: A "TIME OVER 240s" message will be shown if the Ramp Time + Test Time is ≥ 240 seconds when the HI SET limit is over 30mA. This applies to the ACW function only. Note: When tester is in GB or CONT mode, due to without RAMP TIME setting, an "Err" message will be shown if issuing this remote command.
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 ⟶
⟶ Query

MANU:EDIT:MODE

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

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

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

Set ⟶
⟶ Query

MANU:ACW:VOLTage

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 ~ 5.100 (kV)
Example	MANU:ACW:VOLT 1
	Sets the ACW voltage to 1 kV.

MANU:ACW:CHISet

Set →
→ 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
Example	MANU:ACW:CHIS 30.0
	Sets the ACW HI SET current to 30 mA.

MANU:ACW:CLOSet

Set →
→ 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 Err message will be produced. All digits outside the HI SET range are ignored and will not be used.
	For example:
	HI SET value: 30.00
	LO SET value: 30.01 → error
Syntax	MANU:ACW:CLOSet <NR2>
Query Syntax	MANU:ACW:CLOSet?
Parameter/ Return parameter	<NR2> 0.000 ~ 041.9
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 OVER 240s" message will be shown if the Ramp Time + Test Time is ≥ 240 seconds when the HI SET limit is over 30mA. This applies to the ACW function only.
Syntax	MANU:ACW:TTIMe {<NR2>|OFF}
Query Syntax	MANU:ACW:TTIMe?
Parameter	<NR2> 0.3 ~ 999.9 seconds OFF TIMER OFF
Return parameter	<NR2> 0.3 ~ 999.9 seconds TIME OFF TIMER is OFF
Example	MANU:ACW:TTIM 1
	Sets the ACW test time to 1 second.

MANU:ACW:ARCFunction

Set →
→ Query

Description	Sets or returns the ACW ARC function. The test must first be in ACW mode before this command can be used. Note that this command is only workable when ARC SET>HI SET.
Syntax	MANU:ACW:ARCFunction
Query Syntax	{OFF|ON_CONT|ON_STOP}
	MANU:ACW:ARCFunction?
Parameter/	OFF ARC function off
Return parameter	ON_CONT ARC function ON & CONT
	ON_STOP ARC function ON & STOP
Example	MANU:ACW:ARCF OFF
	Sets the ACW ARC function off.

                                                            Set ⟶
MANU:ACW:ARCCurrent   ⟶ Query

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.
Syntax	MANU:ACW:ARCCurrent <NR2>
Query Syntax	MANU:ACW:ARCCurrent?
Parameter/ Return parameter	<NR2> 1.000 ~ 080.0
Example	MANU:ACW:ARCC 1.233
	Sets the ACW ARC value to 1.233 mA.

                                                            Set ⟶
MANU:ACW:ARCSpeed   ⟶ Query

Description	Sets or returns the ACW ARC speed. ARC must be enabled before the ARC speed can be set. The test must first be in ACW mode before this command can be used.
Syntax	MANU:ACW:ARCSpeed {FAST|NORMAL|SLOW}
Query Syntax	MANU:ACW:ARCSpeed?
Parameter/ Return parameter	FAST ARC speed fast
	NORMAL ARC speed normal
	SLOW ARC speed slow
Example	MANU:ACW:ARCS SLOW
	Sets the ACW ARC speed slow.

                                                            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
Return parameter	60	60 Hz

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

Set ⟶
⟶ Query

MANU:ACW:WAITtime

Description	Sets or returns the ACW wait time in seconds. The test must first be in ACW mode before this command can be used.
Syntax	MANU:ACW:WAITtime <NR2>
Query Syntax	MANU:ACW:WAITtime?
Parameter/ Return parameter	<NR2>	0 ~ 999.9 seconds

Example	MANU:ACW:WAIT 10.1
	Sets the ACW wait time to 10.1 s.

Set ⟶
⟶ Query

MANU:ACW:RAMPdown

Description	Sets or returns the ACW Ramp Down Time in seconds. The test must first be in ACW mode before this command can be used.
Syntax	MANU:ACW:RAMPdown <NR2>
Query Syntax	MANU:ACW:RAMPdown?
Parameter/ Return parameter	<NR2>	0 ~ 999.9 seconds

Example	MANU:ACW:RAMP 999.9
	Sets the ramp down time to 999.9 seconds.

Set ⟶
⟶ Query

MANU:ACW:GROUNDMODE

Description	Sets or returns the ACW Ground Mode. The test must first be in ACW mode before this command can be used.

Syntax	MANU:ACW:GROUNDMODE {ON|OFF}
Query Syntax	MANU:ACW:GROUNDMODE?

Parameter/	ON	ACW Ground Mode ON
Return parameter	OFF	ACW Ground Mode OFF

Example	MANU:ACW:GROUNDMODE OFF
	Sets the ACW Ground Mode off.

MANU:ACW:MAXHold

Set ⟶
⟶ Query

Description	Sets or returns the ACW MAX Hold. The test must first be in ACW mode before this command can be used.

Syntax	MANU:ACW:MAXHold {ON|OFF}
Query Syntax	MANU:ACW:MAXHold?

Parameter/	ON	ACW MAX Hold ON
Return parameter	OFF	ACW MAX Hold OFF

Example	MANU:ACW:MAXH OFF
	Sets the ACW MAX Hold off.

MANU:ACW:PASShold

Set ⟶
⟶ Query

Description	Sets or returns the duration of ACW PASS Hold in seconds. The test must first be in ACW mode before this command can be used.

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

Parameter/	<NR2>	0 ~ 999.9 seconds
Return parameter		

Example	MANU:ACW:PASS 999.9
	Sets the ACW PASS Hold time to 999.9 seconds.

MANU:ACW:REF

Set →
→ Query

Description	Sets or returns the ACW reference value in uA or mA. The test must first be in ACW mode before this command can be used.
	The ACW reference value shares the identical limit of HI SET value, which is 42mA at the maximum. For instance, when HI SET value is set 10mA, the reference value can therefore be set up to 32mA.
Syntax	MANU:ACW:REF <NR2>
Query Syntax	MANU:ACW:REF?
Parameter/ Return parameter	<NR2> 0.000 ~ 41.00
Example	MANU:ACW:REF 40
	Sets the ACW reference to 40 mA.

MANU:ACW:INITvoltage

Set →
→ Query

Description	Sets or returns the ACW percentage of initial voltage. The test must first be in ACW mode before this command can be used.
Syntax	MANU:ACW:INITvoltage <NR1>
Query Syntax	MANU:ACW:INITvoltage?
Parameter/ Return parameter	<NR1> 0 ~ 99%
Example	MANU:ACW:INIT 87
	Sets the ACW Initial Voltage to 87%.

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.
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.
Syntax	MANU:DCW:CHISet <NR2>
Query Syntax	MANU:DCW:CHISet?
Parameter/ Return parameter	<NR2> 0.001 ~ 11.00 (mA)
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 Err will be produced. All digits outside the HI SET range are ignored and will not be used.

For example:

HI SET value: 10.99
LO SET value1: 11.00 → error

Syntax	MANU:DCW:CLOSet<NR2>
Query Syntax	MANU:DCW:CLOSet?
Parameter/ Return parameter	<NR2> 0.000 ~ 10.99
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.
Syntax	MANU:DCW:TTIMe {<NR2>|OFF}
Query Syntax	MANU:DCW:TTIMe?
Parameter	<NR2> 0.3 ~ 999.9 seconds
	OFF TIMER OFF
Return parameter	<NR2> 0.3 ~ 999.9 seconds
	TIME OFF TIMER is OFF
Example	MANU:DCW:TTIM 1
	Sets the DCW test time to 1 second.

Set ⟶
MANU:DCW:ARCFunction
⟶ Query

Description	Sets or returns the DCW ARC function. The test must first be in DCW mode before this command can be used. Note that this command is only workable when ARC SET>HI SET.
Syntax	MANU:DCW:ARCFunction
Query Syntax	{OFF|ON_CONT|ON_STOP}
	MANU:DCW:ARCFunction?
Parameter/	OFF ARC function off
Return parameter	ON_CONT ARC function ON & CONT
	ON_STOP ARC function ON & STOP
Example	MANU:DCW:ARCF OFF
	Sets the DCW ARC function off.

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.
Syntax	MANU:DCW:ARCCurrent <NR2>
Query Syntax	MANU:DCW:ARCCurrent?
Parameter/	<NR2> 1.000 ~ 80.00
Return parameter	
Example	MANU:DCW:ARCC 10
	Sets the DCW ARC value to 10mA.

Set ⟶
MANU:DCW:ARCSpeed
⟶ Query

Description	Sets or returns the DCW ARC speed. ARC must be enabled before the ARC speed can be set. The test must first be in DCW mode before this command can be used.

Syntax	MANU:DCW:ARCSpeed {FAST|NORMAL|SLOW}	
Query Syntax	MANU:DCW:ARCSpeed?	
Parameter/ Return parameter	FAST NORMAL SLOW	ARC speed fast ARC speed normal ARC speed slow
Example	MANU:DCW:ARCS SLOW	
	Sets the DCW ARC speed slow.	

MANU:DCW:WAITtime

Set →
→ Query

Description	Sets or returns the DCW wait time in seconds. The test must first be in DCW mode before this command can be used.
Syntax	MANU:DCW:WAITtime <NR2>
Query Syntax	MANU:DCW:WAITtime?
Parameter/ Return parameter	<NR2> 0 ~ 999.9 seconds
Example	MANU:DCW:WAIT 10.1
	Sets the DCW wait time to 10.1 s.

MANU:DCW:RAMPdown

Set →
→ Query

Description	Sets or returns the DCW Ramp Down Time in seconds. The test must first be in DCW mode before this command can be used.
Syntax	MANU:DCW:RAMPdown <NR2>
Query Syntax	MANU:DCW:RAMPdown?
Parameter/ Return parameter	<NR2> 0 ~ 999.9 seconds
Example	MANU:DCW:RAMP 999.9
	Sets the DCW ramp down time to 999.9 seconds.

Set →

MANU:DCW:GROUNDMODE   → Query

Description	Sets or returns the DCW Ground Mode. The test must first be in DCW mode before this command can be used.	
Syntax	MANU:DCW:GROUNDMODE {ON|OFF}	
Query Syntax	MANU:DCW:GROUNDMODE?	
Parameter/ Return parameter	ON	DCW Ground Mode ON
	OFF	DCW Ground Mode OFF
Example	MANU:DCW:GROUNDMODE OFF	
	Sets the DCW Ground Mode off.	

Set →

MANU:DCW:MAXHold   → Query

Description	Sets or returns the DCW MAX Hold. The test must first be in DCW mode before this command can be used.	
Syntax	MANU:DCW:MAXHold {ON|OFF}	
Query Syntax	MANU:DCW:MAXHold?	
Parameter/ Return parameter	ON	DCW MAX Hold ON
	OFF	DCW MAX Hold OFF
Example	MANU:DCW:MAXH OFF	
	Sets the DCW MAX Hold off.	

Set →

MANU:DCW:PASShold   → Query

Description	Sets or returns the duration of DCW PASS Hold. The test must first be in DCW mode before this command can be used.	
Syntax	MANU:DCW:PASShold <NR2>	
Query Syntax	MANU:DCW:PASShold?	
Parameter/ Return parameter	<NR2>	0 ~ 999.9 seconds

Example   MANU:DCW:PASS 999.9

                 Sets the DCW PASS Hold time to 999.9 seconds.

MANU:DCW:REF

Set →
→ Query

Description	Sets or returns the DCW reference value in uA or mA. The test must first be in DCW mode before this command can be used.
	The DCW reference value shares the identical limit of HI SET value, which is 11mA at the maximum. For instance, when HI SET value is set 5mA, the reference value can therefore be set up to 6mA.
Syntax	MANU:DCW:REF <NR2>
Query Syntax	MANU:DCW:REF?
Parameter/ Return parameter	<NR2> 0.000 ~ 10.00
Example	MANU:DCW:REF 10
	Sets the DCW reference to 10 mA.

MANU:DCW:INITvoltage

Set →
→ Query

Description	Sets or returns the DCW percentage of initial voltage. The test must first be in DCW mode before this command can be used.
Syntax	MANU:DCW:INITvoltage <NR1>
Query Syntax	MANU:DCW:INITvoltage?
Parameter/ Return parameter	<NR1> 0 ~ 99%
Example	MANU:DCW:INIT 87
	Sets the DCW Initial Voltage to 87%.

Set →

MANU:IR:VOLTage

→ 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 ~ 1.2 (0.05kV to 1.2kV: steps of .05)
Example	MANU:IR:VOLT 1	
	Sets the IR voltage to 1 kV.	

Set →

MANU:IR:RHISet

→ Query

Description	Sets or returns the IR HI SET resistance value in MΩ or GΩ. The test must first be in IR mode before this command can be used.	
Syntax	MANU:IR:RHISet <NR2>|NULL	
Query Syntax	MANU:IR:RHISet?	
Parameter/ Return parameter	<NR1>	001.1M ~ 50.00G
	NULL	Sets the HI SET value to OFF.
Example	MANU:IR:RHIS 10	
	Sets the IR HI SET resistance to 10 MΩ.	

Set →

MANU:IR:RLOSet

→ Query

Description	Sets or returns the IR LO SET resistance value in MΩ 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<NR2>	
Query Syntax	MANU:IR:RLOSet?	
Parameter/ Return parameter	<NR1>	000.2M ~ 50.00G

Example	MANU:IR:RLOS 10
	Sets the IR LO SET resistance to 10MΩ.

MANU:IR:TTIMe

Set →
→ Query

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> 0.3 ~ 999.9 seconds
Example	MANU:IR:TTIM 1
	Sets the IR test time to 1 second.

MANU:IR:WAITtime

Set →
→ Query

Description	Sets or returns the IR wait time in seconds. The test must first be in IR mode before this command can be used.
Syntax	MANU:IR:WAITtime <NR2>
Query Syntax	MANU:IR:WAITtime?
Parameter/ Return parameter	<NR2> 0 ~ 999.9 seconds
Example	MANU:IR:WAIT 10.1
	Sets the IR wait time to 10.1 s.

MANU:IR:RAMPdown

Set →
→ Query

Description	Sets or returns the IR Ramp Down Time in seconds. The test must first be in IR mode before this command can be used.
Syntax	MANU:IR:RAMPdown <NR2>
Query Syntax	MANU:IR:RAMPdown?

Parameter/ Return parameter	<NR2>	0 ~ 999.9 seconds

Example	MANU:IR:RAMP 999.9
	Sets the IR ramp down time to 999.9 seconds.

Set →
→ Query

MANU:IR:GROUNDMODE

Description	Sets or returns the IR Ground Mode. The test must first be in IR mode before this command can be used.

Syntax	MANU:IR:GROUNDMODE {ON|OFF}
Query Syntax	MANU:IR:GROUNDMODE?

Parameter/ Return parameter	ON	IR Ground Mode ON
	OFF	IR Ground Mode OFF

Example	MANU:IR:GROUNDMODE OFF
	Sets the IR Ground Mode off.

Set →
→ Query

MANU:IR:MAXHold

Description	Sets or returns the IR MAX Hold. The test must first be in IR mode before this command can be used.

Syntax	MANU:IR:MAXHold {ON|OFF}
Query Syntax	MANU:IR:MAXHold?

Parameter/ Return parameter	ON	IR MAX Hold ON
	OFF	IR MAX Hold OFF

Example	MANU:IR:MAXH OFF
	Sets the IR MAX Hold off.

MANU:IR:PASShold

Set →
→ Query

Description	Sets or returns the duration of IR PASS Hold. The test must first be in IR mode before this command can be used.
Syntax	MANU:IR:PASShold <NR2>
Query Syntax	MANU:IR:PASShold?
Parameter/ Return parameter	<NR2> 0 ~ 999.9 seconds
Example	MANU:IR:PASS 999.9
	Sets the IR PASS Hold time to 999.9 seconds.

MANU:IR:REF

Set →
→ Query

Description	Sets or returns the IR reference value in MΩ or GΩ. The test must first be in IR mode before this command can be used.
Syntax	MANU:IR:REF <NR2>
Query Syntax	MANU:IR:REF?
Parameter/ Return parameter	<NR2> 0.0 ~ 50000
Example	MANU:IR:REF 900
	Sets the IR reference to 900 MΩ.

MANU:IR:MODE

Set →
→ Query

Description	Sets or returns the IR Mode in IR. The test must first be in IR mode before this command can be used.
Syntax Query Syntax	MANU:IR:MODE {STOP_ON_FAIL|STOP_ON_PASS|TIMER} MANU:IR:MODE?
Parameter/ Return parameter	STOP ON FAIL IR Mode in Stop On FAIL
	STOP ON PASS IR Mode in Stop On PASS

TIMER	IR Mode in Timer

Example   MANU:IR:MODE TIMER

Sets the IR Mode in Timer setting.

MANU:GB:CURRent

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

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

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
Example	MANU:GB:CURR 3.00
	Sets the GB current to 3.00A.

MANU:GB:RHISet

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

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

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 GB HI SET value to 100mΩ.

⚠ Note   If the GB current x (HI SET resistance + REF) > 7.2V, then an error will be generated ("GB OVER 200W").

MANU:GB:RLOSet

Set →
→ 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:GB:RLOSet?
Parameter/ Return parameter	<NR2> 0.000 ~ 649.9
Example	MANU:GB:RLOS 50
	Sets the GB LO SET resistance to 50mΩ.

MANU:GB:TTIMe

Set →
→ 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> 0.3 ~ 999.9 seconds
Example	MANU:GB:TTIM 1
	Sets the GB test time to 1 second.

MANU:GB:FREQuency

Set →
→ Query

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/ Return parameter	50 50 Hz
	60 60 Hz

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

MANU:GB:CONTact

Set →
→ Query

Description	Sets or returns the GB Contact Time in seconds. The test must first be in GB mode before this command can be used.
Syntax	MANU:GB:CONTact <NR2>
Query Syntax	MANU:GB:CONTact?
Parameter/ Return parameter	<NR2>	0 ~ 999.9 seconds
Example	MANU:GB:CONTact 999.9
	Sets the GB Contact time to 999.9 seconds.

MANU:GB:GROUNDMODE

Set →
→ Query

Description	Sets or returns the GB Ground Mode. The test must first be in GB mode before this command can be used.
Syntax	MANU:GB:GROUNDMODE {ON|OFF}
Query Syntax	MANU:GB:GROUNDMODE?
Parameter/ Return parameter	ON	GB Ground Mode ON
	OFF	GB Ground Mode OFF
Example	MANU:GB:GROUNDMODE OFF
	Sets the GB Ground Mode off.

MANU:GB:MAXHold

Set →
→ Query

Description	Sets or returns the GB MAX Hold. The test must first be in GB mode before this command can be used.
Syntax	MANU:GB:MAXHold {ON|OFF}
Query Syntax	MANU:GB:MAXHold?
Parameter/	ON	GB MAX Hold ON

Return parameter	OFF	GB MAX Hold OFF

Example	MANU:GB:MAXH OFF
	Sets the GB MAX Hold off.

MANU:GB:PASShold

Set →
→ Query

Description	Sets or returns the duration of GB PASS Hold. The test must first be in GB mode before this command can be used.

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

Parameter/ Return parameter	<NR2>	0 ~ 999.9 seconds

Example	MANU:GB:PASS 999.9
	Sets the GB PASS Hold time to 999.9 seconds.

MANU:GB:REF

Set →
→ Query

Description	Sets or returns the GB reference value in mΩ. The test must first be in GB mode before this command can be used.
	Beware that when ISET x (HIEST + REF) is greater than 7.2V, the "GBV OVER" warning message will be shown on display.

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

Parameter/ Return parameter	<NR2>	0.000 ~ 650.0

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

Set ⟶

MANU:GB:ZEROCHECK

⟶ Query

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 69 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 GB ZERO function.

Set ⟶

MANU:CONTinuity:RHISet

⟶ Query

Description	Sets or returns the CONT HI SET resistance value in Ω. The test must first be in CONT mode before this command can be used.
Syntax	MANU:CONTinuity:RHISet <NR2>
Query Syntax	MANU:CONTinuity:RHISet?
Parameter/ Return parameter	<NR2> 00.01 ~ 90.00 Ω
Example	MANU:CONT:RHIS 30.0
	Sets the CONT HI SET current to 30 Ω.

Set →

MANU:CONTinuity:RLOSet   → Query

Description	Sets or returns the CONT LO SET resistance value in Ω. The LO SET value must be less than the HI SET value. The test must first be in CONT 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 Err message will be produced. All digits outside the HI SET range are ignored and will not be used.
	For example:
	HI SET value: 10.00
	LO SET value: 10.01 → error
Syntax	MANU:CONTinuity:RLOSet <NR2>
Query Syntax	MANU:CONTinuity:RLOSet?
Parameter/ Return parameter	<NR2> 00.00 ~ 89.99 Ω
Example	MANU:CONT:RLOS 20.0
	Sets the CONT LO SET current to 20 Ω.

Set →

MANU:CONTinuity:TTIMe   → Query

Description	Sets or returns the CONT test time in seconds. The test must first be in CONT mode before this command can be used.	
Syntax	MANU:CONTinuity:TTIMe {<NR2>|OFF}	
Query Syntax	MANU:CONT:TTIMe?	
Parameter	<NR2>	0.3 ~ 999.9 seconds
	OFF	TIMER OFF
Return parameter	<NR2>	0.3 ~ 999.9 seconds
	TIME OFF	TIMER is OFF

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

MANU:CONTinuity:PASShold

Set ⟶

⟶ Query

Description	Sets or returns the duration of CONT PASS Hold. The test must first be in CONT mode before this command can be used.
Syntax	MANU:CONT:PASShold <NR2>
Query Syntax	MANU:CONT:PASShold?
Parameter/ Return parameter	<NR2> 0 ~ 999.9 seconds
Example	MANU:CONT:PASS 999.9
	Sets the CONT PASS Hold time to 999.9 seconds.

Set →
→ Query

MANU:CONTinuity:REF

Description	Sets or returns the CONT reference value in Ω. The test must first be in CONT mode before this command can be used.
	Note: when HI SET+REF VALUE is over 90 Ω, the message "CONT. TEST V OVER" will be shown indicating the limited 90 Ω is reached and beyond.
Syntax	MANU:CONTinuity:REF <NR2>
Query Syntax	MANU:CONTinuity:REF?
Parameter/ Return parameter	<NR2> 00.00 ~ 90.00 Ω
Example	MANU:CONT:REF 0.01
	Sets the CONT reference to 00.01 Ω.

Set →
→ Query

MANU:CONTinuity:ZEROCHECK

Description	Performs the zero check function. The test must first be in CONT mode and in the Ready Status before this command can be used.
	See page 69 for details on the ZERO function.
Syntax	MANU:CONTinuity:ZEROCHECK {ON|OFF}
Query Syntax	MANU:CONTinuity:ZEROCHECK?
Parameter/ Return parameter	ON Zero function is active.
	OFF Zero function is not active.
Example	MANU:CONT:ZEROCHECK OFF
	Deactivates the CONT ZERO function.

Auto Commands

AUTO:STEP

<div align="right">

Set ⟶
⟶ Query

</div>

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:NAME

<div align="right">

Set ⟶
⟶ Query

</div>

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⟩→
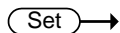
Description	Add the selected MANU test to the current AUTO number.
Syntax	AUTO:EDIT:ADD <NR1>
Parameter/	<NR1> 1~100
Example	AUTO:EDIT:ADD 7
	Adds MANU STEP 007 to the current AUTO number.

Set ⟶

⟶ Query

AUTO<x>:EDIT:HOLD

Description	Sets or returns the actions for STEP HOLD of each MANU STEP in AUTO test.	
Syntax	AUTO<x>:EDIT:HOLD {<NR2>|PH_FH|PH_FS|PH_FC|PC_FH|PC_FS|PC_FC}	
Query Syntax	AUTO<x>:EDIT:HOLD?	
Parameter/ Return parameter	<NR2>	0.1 ~ 999.9 seconds
	PH_FH	Sets Pass Hold & Fail Hold action
	PH_FS	Sets Pass Hold & Fail Stop action
	PH_FC	Sets Pass Hold & Fail Continue action
	PC_FH	Sets Pass Continue & Fail Hold action
	PC_FS	Sets Pass Continue & Fail Stop action
	PC_FC	Sets Pass Continue & Fail Continue action
Example	AUTO1:EDIT:HOLD PH_FH	
	Sets the Pass Hold & Fail Hold action for MANU STEP 01 in the current AUTO test.	

Set ⟶

⟶ Query

AUTO<x>:EDIT:SKIP

Description	Sets or returns the SKIP action for each MANU STEP in AUTO test.	
Syntax	AUTO<x>:EDIT:SKIP {<NR1>|ON|OFF}	
Query Syntax	AUTO<x>:EDIT:SKIP?	
Parameter/ Return parameter	<NR1>	Sets MANU STEP from 1 – 10 for skip
	ON	Turns SKIP action for the designated MANU STEP on
	OFF	Turns SKIP action for the designated MANU STEP off
Example	AUTO1:EDIT:SKIP ON	
	Enables SKIP function for MANU STEP 01 in AUTO test.	

AUTO:EDIT:DEL   ⟨Set⟩⟶

Description	Deletes the designated MANU STEP within the current AUTO test.
Syntax	AUTO:EDIT:DEL {<NR1>|ALL}
Parameter	<NR1> Deletes selected MANU STEP from 1 – 10
	ALL Deletes all the MANU STEPs
Example	AUTO:EDIT:DEL 3
	Deletes the MANU STEP 3 from the current AUTO test.

AUTO:TEST:RETURN   ⟶⟨Query⟩

Description	Returns the number of AUTO test and MANU STEP that is being tested currently.
Query Syntax	AUTO:TEST:RETURN?
Return parameter	String The returned string will be in the format of AUTO number followed by MANU STEP number. AUTO-XXX,STEP-XX
Example	AUTO:TEST:RETURN?
	AUTO-004,STEP-03
	The MANU STEP-03 of AUTO-004 is being tested.

AUTO:EDIT:SHOW   ⟶⟨Query⟩

Description	Returns all the information of the current AUTO test page. v
Query Syntax	AUTO:EDIT:SHOW?
Return parameter	String The returned strings will be shown in the way almost identical to the contents displayed on an AUTO test page.

Example   AUTO:EDIT:SHOW?

>AUTO-001 AUTO_NAME
>STEP,MODE,V/I SET,HI SET ,LOW SET,STEP HOLD
>_____
>001 ,ACW ,0.100kV,1.000mA,000 uAs,P.C/F.C
>001 ,ACW ,0.100kV,1.000mA,000 uA,P.C/F.C
>001 ,ACW ,0.100kV,1.000mA,000 uA,P.C/F.C
>001 ,ACW ,0.100kV,1.000mA,000 uA,P.C/F.C
>001 ,ACW ,0.100kV,1.000mA,000 uA,P.C/F.C
>001 ,ACW ,0.100kV,1.000mA,000 uA,P.C/F.C
>001 ,ACW ,0.100kV,1.000mA,000 uA,P.C/F.C
>001 ,ACW ,0.100kV,1.000mA,000 uA,P.C/F.C
>001 ,ACW ,0.100kV,1.000mA,000 uA,P.C/F.C
>001 ,ACW ,0.100kV,1.000mA,000 uA,P.C/F.C

Sweep Commands

SWEEP:DATA:STATus   ➔ Query

Description	Returns the basic status of get data.	
Query Syntax	SWEEP:DATA:STA?	
Return parameter	\<String\>	The returned string will be in the format below: STEP, TEST MODE, V SET, HI SET, TOTAL DATA
Example	SWEEP:DATA:STA?	
	> STEP, MODE, V SET , HI SET , TOTAL DATA	
	000 , DCW , 0.450kV, 1.700mA, 00076	

SWEEP:DATA:SHOW   ➔ Query

Description	Returns the full measured readings of get data.	
Query Syntax	SWEEP:DATA:SHOW\<NR1\>	
Return parameter	\<NR1\>	0~10000. 0 stands for the full steps. 1~10000 indicates the designated step.
Example	SWEEP:DATA:SHOW 0	
	> TIMER , READ V, READ I	
	0000.1s , 0.003kV, 007uA	
	0000.2s , 0.008kV, 026uA	
	0000.3s , 0.019kV, 064uA	
	0000.4s , 0.028kV, 095uA	
	0000.5s , 0.037kV, 126uA	
	0000.6s , 0.045kV, 153uA	

SWEEP:GRAPh:SHOW

Set ⟶

⟶ Query

Description	Displays or turns off Sweep graph on LCD screen. Also Returns if Sweep graph is shown on LCD.
Syntax	SWEEP:GRAPh:SHOW {ON|OFF}
Query Syntax	SWEEP:GRAPh:SHOW?
Parameter/ Return parameter	ON	To enable Sweep graph on LCD
	OFF	To disable Sweep graph on LCD
	?	Returns if Sweep graph is shown on LCD
Example	SWEEP:GRAP:SHOW?
	> OFF
	Sweep graph is Not displayed on LCD screen.

Common Commands

*CLS   Set ⟶

Description	The *CLS command clears the internal registers and error message, if any.
Syntax	*CLS

*IDN   ⟶ Query

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-12004 ,GPT12000　,T0.01I
Model number : GPT-12004
Serial number :8 characters serial number
Firmware version : T0.01I

*SRE   ➝ Query

Description	AUTO MODE only. Use this command to get measurement step number at the current point in time during AUTO MODE testing.
Query Syntax	*SRE?
Return parameter	<NR1> 00~50
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.

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

Error Messages

Background   The possible error messages returned from
                          SYST:ERR? query are well listed below.

Error	Error Code
No Error	0
Command Error	20
Value Setting Error	21
String Setting Error	22
Query Error	23
MODE Setting Error	24
Time Error	25
DC Over 50W	26
GBV > 7.2V	27
ARC <= HI Set	28
HI Set => ARC	29
Voltage Setting Error	30
Current Setting Error	31
Current HI Set Error	32
Current LO Set Error	33
Resistance HI Set Error	34
Resistance LO Set Error	35
REF Setting Error	36
Frequency Setting Error	37
ARC Setting Error	38
RAMP Time Setting Error	39
TEST Time Setting Error	40
WAIT Time Setting Error	41
RAMP Down Setting Error	42
PASS Hold Setting Error	43
GB Contact Setting Error	44
Setting Over 200W	45
CONT Setting Over 9V	46
Auto Step Add Full	47
This Is The Last Step	48
Auto Connect Set Error	49

F_{AQ}

- The tester will not turn on.
- The panel keys are not working.
- The measured value of IR or GB test does not match the specification.
- When I press the START button the tester will not start testing?

The tester will not turn on?

Ensure the power cord is connected. Check and make sure the fuse is not blown and properly installed. See page 211.

The panel keys are not working?

Ensure the tester is not in the SIGNAL I/O or Remote Control mode (page 122). If it is, refer to page 155 for how to return to front panel control. Also, if Key Lock is enabled, all panel keys except START and STOP are disabled. Refer to page 123 for details.

The measured value of IR test does not match the specification?

Make sure the tester is powered on for warm-up of at least 30 minutes, within +15°C~+35°C. This is necessary to stabilize the tester to match the specification. After warm-up, please proceed to Ground Check procedure.

The measured value of GB test does not match the specification?

Make sure the tester is powered on for warm-up of at least 30 minutes, within +15°C~+35°C. This is necessary to stabilize the tester to match the specification. After warm-up, please proceed to Zero Check procedure. Refer to page 69 for details.

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 76 (manual test), 104(automatic test).

If Double Action is enabled, the START button must be pressed within 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 starts. See page 150.

Lastly, if Start Click For 1 Second is enabled, it is required to press and hold the START button for 1 second above to initiate a test. Pressing the START button below 1 second will not start a test.
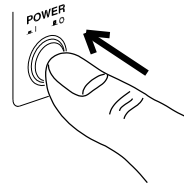
For more information, contact your local dealer or GWInstek at www.gwinstek.com / marketing@goodwill.com.tw.
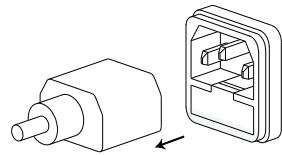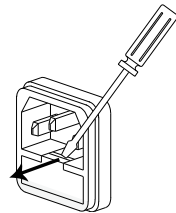
APPENDIX

Fuse Replacement

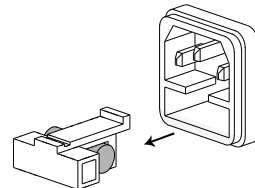Steps

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.

Fuse Rating   T 4A, 250V

Test Errors

The following test error messages highlighted in red may appear on the GPT-12000 display when completing a running test.

Error Messages	Description
HI FAIL	Test result is beyond the HI SET value
LOW FAIL	Test result is below the LOW SET value
V OVER	Measured voltage is beyond the set value by 1.1 times
V LOW	Measured voltage is below the set value by 0.9 time
SHORT	Voltage short-circuit detected
GBI OVER	Measured current is beyond the set value by 1.1 times
GBI LOW	Measured current is below the set value by 0.9 time
GBV OVER	Measured GB voltage is beyond 7.2V
CONT V ERR	Measured CONT voltage is beyond 9.0V
ARC ERR	ARC abnormality detected
GFCI ERR	Ground fault circuit interrupt

The following setup error messages highlighted in red may appear on the GPT-12000 display when abnormality occurs in the settings of MANU steps.

Error Messages	Description
TEST MODE ERROR	Setting error in ACW/DCW
VOLTAGE SET ERROR	Setting error in voltage
CURRENT SET ERROR	Setting error in current
MANU STEP ERROR	Setting error in MANU STEP value
MANU NAME ERROR	Setting error in MANU NAME
HI SET ERROR	Setting error in HI SET value
HISET <= LOWSET	Set value of HI SET is less than or equal to LOW SET value
HISET >= ARC	Set value of HI SET is greater than or equal to ARC SET value
LOW SET ERROR	Setting error in LOW SET
TEST TIME ERROR	Setting error in TEST TIME

RAMP TIME ERROR	Setting error in RAMP TIME
ARC FUNC ERROR	Setting error in ARC FUNC
ARC SET ERROR	Setting error in ARC SET
ARC SPEED ERROR	Setting error in ARC SPEED
FREQ SET ERROR	Setting error in FREQ of ACW/GB
WAIT TIME ERROR	Setting error in WAIT TIME
GB CONTACT ERROR	Setting error in GB CONTACT
RAMP DOWN ERROR	Setting error in RAMP DOWN
GROUND ERROR	Setting error in GROUND MODE
MAX HOLD ERROR	Setting error in MAX HOLD
PASS HOLD ERROR	Setting error in PASS HOLD
REF SET ERROR	Setting error in REF VALUE
GBV OVER	Setting Error in ISET x (HI SET + REF) > 7.2V of GB Mode
INIT VSET ERROR	Setting error in INIT VOLTAGE
IR MODE ERROR	Setting error in IR MODE
DCW OVER 50W	Setting error in V * I > 50W of DCW Mode
GB OVER 200W	Setting error in V * I > 200W of GB Mode
ZERO SET ERROR	Setting Error in ZERO CHECK
CONT. TEST V OVER	Setting Error in ISET(100mA) x (HI SET + REF) > 9V of CONT Mode
TIME OVER 240s	TIME OVER 240s is displayed when, under ACW test mode, HI SET is greater than 30mA and the RAMP TIME plus the TEST TIME setting is > 240 seconds.
POWER GND FAIL	Power cord fails to connect with earth ground

GPT-12000 Specifications

The specifications apply when the GPT-12000 is powered on for at least 30 minutes at 15˚C~35˚C.

Specifications

General

DISPLAY	7" color LCD
MEMORY	AUTO/MANU mode 100 memory blocks total
POWER SOURCE	AC 100V~240V ± 10%, 50Hz/60Hz
ACCESSORIES	Power cord x1, Quick Start Guide x1 User Manual x1(CD) GHT-115 x1 for GPT-12001/2/3 GHT-115 x1, GTL-215 x1 for GPT-12004
DIMENSIONS & WEIGHT	Approx. 380(W) x 148(H) x454(D) / 15kg

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	1V
Output Voltage Accuracy	± (1% of setting +5V) with no load
Maximum Rated Load(Table1)	200VA (5kV/40mA)[GPT-12XXX]
Maximum Rated Current	40mA[GPT-12XXX]
	0.001mA~10mA(0.05kV≤V≤0.5kV)
	0.001mA~40mA(0.5kV<V≤5kV)
Output Voltage Waveform	Sine wave
Frequency	50 Hz / 60 Hz
Voltage Regulation	± (1% +5V)[Maximum rated load →no load]
Voltmeter Accuracy	± (1% of reading+ 5 V)
Current Measurement Range	0.001mA~40.00mA [GPT-12XXX]
Current Best Resolution	1uA
	1uA (1uA~9.999mA)
	10uA(10.00mA~40.00mA)
Current Measurement Accuracy	± (1.5% of reading+30uA)
Judgment Accuracy	± (3% of setting+30uA)
Window Comparator Method	Yes
ARC DETECT	Yes
Rise-time Control Function	Yes
RAMP TIME (Rise Time)	0.1~999.9S
Fall-time Control Function	Yes
RAMP DOWN Time	0.0~999.9S
TIMER (Test Time)[2]	OFF, 0.3S~999.9S
GND	ON/OFF
WAIT TIME	0.0~999.9S

[1] At least 0.3 seconds is needed to reach a set voltage of 50V/10mA.
[2] Timer can only be turned off when the upper current is set below 30mA.

DC Withstanding Voltage

Output Voltage Range	0.050kV~ 6.000kV[1]
Output Voltage Resolution	1V
Output Voltage Accuracy	±(1% of setting +5V) With no load
Maximum Rated Load	50W(5kV/10mA) [GPT-12xxx]
Maximum Rated Current	10mA [GPT-12XXX]
	0.001mA~2mA(0.05kV≤V≤0.5kV)
	0.001mA~10mA(0.5kV<V≤6kV)
Voltmeter Accuracy	± (1% of reading+ 5 V)
Voltage Regulation	± (1% +5V)[Maximum rated load ->no load]
Current Measurement Range	0.001mA-10.00mA
Current Measurement Best	0.1uA
Resolution	0.1uA (0.1uA~999.9uA)
	1uA(1uA~9.999mA)
	10uA(10.00mA)
Current Measurement	±(1.5% of reading+3uA) when I<1mA
Accuracy	±(1.5% of reading+30uA) when I≥1mA
Judgment Accuracy	± (3% of setting+30uA)
Window Comparator Method	Yes
ARC DETECT	Yes
Rise-time Control Function	Yes
RAMP TIME (Rise Time)	0.1~999.9S
Fall-time Control Function	Yes
RAMP DOWN Time	0.0~999.9S
TIMER (Test Time)	OFF, 0.3S~999.9S
GND	ON/OFF
WAIT TIME	0.0~999.9S
Maximum Capacitive Load DC Mode	1uF

[1] At least 0.3 seconds is needed to reach a set voltage of 50V/2mA.

Insulation Resistance Test

Output Voltage	50V-1200V	
Output Voltage Resolution	50V	
Output Voltage Accuracy	±(1% of setting +5V) with no load	
Resistance Measurement Range	0.1MΩ~50GΩ	
Test Voltage	Measurement Range	Accuracy
50V≤V≤450V	0.1MΩ~1MΩ	5% of reading + 3 count
	1MΩ~50MΩ	5% of reading + 1 count
	51MΩ~2GΩ	10% of reading + 1 count
500V≤V≤1200V	0.1MΩ~1MΩ	5% of reading + 3 count
	1MΩ~500MΩ	5% of reading + 1 count
	501MΩ~9.999GΩ	10% of reading + 1 count
	10G~50GΩ	20% of reading + 1 count[1]
Test Voltage	Display Range	
50V≤V≤100V	000.1MΩ~10.00GΩ	
150V≤V≤450V	000.1MΩ~20.00GΩ	
500V≤V≤1200V	000.1MΩ~50.00GΩ	
Voltage regulation	± (1% +5V) [Maximum rated load ->no load	
Voltmeter Accuracy	±(1% of reading +5V)	
Short-Circuit Current	10mA max.	
Output Impedance	2kΩ	
Window Comparator Method	Yes	
Rise-time Control Function	Yes	
RAMP TIME (Rise Time)	0.1~999.9S	
Fall-time Control Function	Yes	
RAMP DOWN Time	0.0~999.9S	
WAIT TIME	0.0~999.9S	
TIMER (Test Time)	0.3S~999.9S[2]	
GND	ON/OFF	

NOTE: It is required to implement GND OFFSET action when IR Ground Mode is On.

[1] When IR Ground Mode is On, the maximum 30Gohm measurement range is guaranteed.
[2] When IR Ground Mode is On, test time starts from 0.5 second.

Ground Bond Test

Output Current Range	3.00A~32.00A
Output Current Accuracy	±(1% of setting+0.2A) when 3A≤I ≤8A
	±(1% of setting+0.05A) 8A < I ≤ 32A
Output Current Resolution	0.01A
Test Voltage	Approximately max. 8VAC (open-circuit)
Frequency	50Hz/60Hz selectable
Ohmmeter Measurement Range	1mΩ ~ 650mΩ
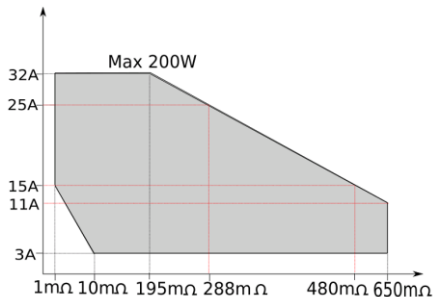
Ohmmeter Measurement Resolution	0.1mΩ
Ohmmeter Measurement Accuracy	±(1% of reading+2mΩ)
Ohmmeter Judgment Accuracy	±(1% of setting+2mΩ)
Window Comparator Method	Yes
TIMER (Test Time)	0.3S~999.9S
GND	ON/OFF

Continuity Test

Output Current	100mA(DC)
Ohmmeter Measurement Range	0.10Ω~90.00Ω
Ohmmeter Measurement Resolution	0.01Ω
Ohmmeter Measurement Accuracy	±(10% of reading+2Ω)
Ohmmeter Judgment Accuracy	±(10% of setting+2Ω)
Window Comparator Method	Yes
TIMER (Test Time)	0.3S~999.9S

Interface

REMOTE (Remote terminal)	Yes
SIGNAL IO	Yes
RS232	Yes
USB (Device)	Yes (USB 2.0)
Rear Output	Yes
USB (Host) for data output port	Yes (USB 2.0)
GPIB	Yes (Optional)

Table 1: Output Limitation in Withstanding Voltage Testing

Function	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≤32A	At least as long as the output time	999.9 seconds
	3A≤I≤15A	Not necessary	999.9 seconds
NOTE: Output Time = Ramp Time + Test Time.			

GPT-12001/12002/12003 Dimensions

387.1

19.7

148 133.3

380

436

GPT-12004 Dimensions

387.1

28.2

380

148

133.3

453.8
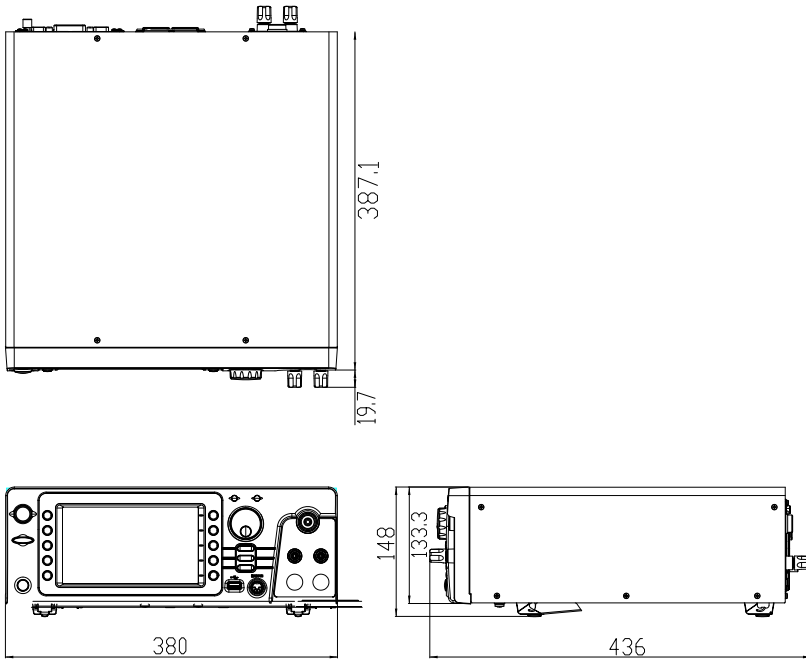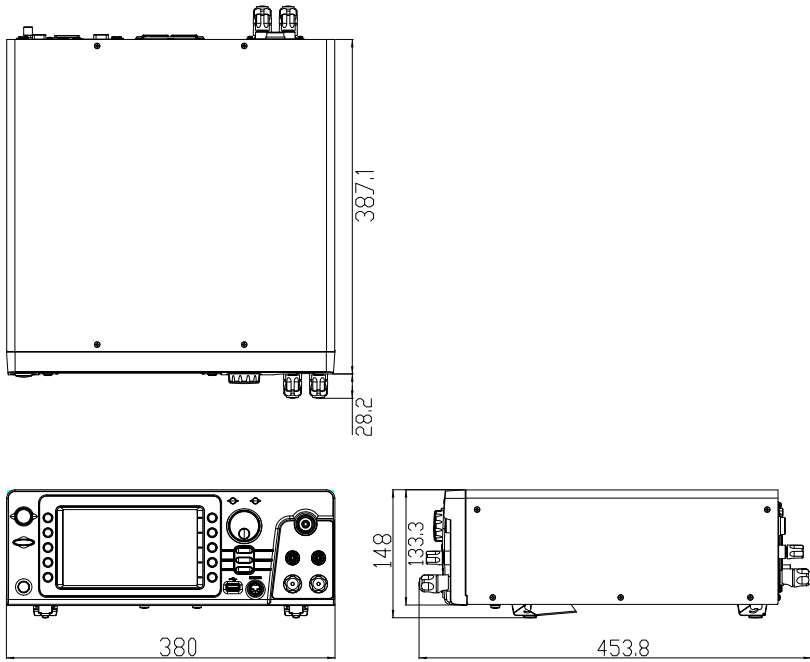
Declaration of Conformity

We

GOOD WILL INSTRUMENT CO., LTD.

declare that the below mentioned product

Type of Product: Electrical Safety Analyzer

Model Number: **GPT-12001 / GPT-12002/ GPT-12003 / GPT-12004**

satisfies all the technical relations application to the product within the scope of council:

Directive: 2014/30/EU; 2014/35/EU; 2011/65/EU; 2012/19/EU

The above product is in conformity with the following standards or other normative documents:

◎ **EMC**

EN 61326-1: EN 61326-2-1:	Electrical equipment for measurement, control and laboratory use –– EMC requirements (2013)	
Conducted & Radiated Emission EN 55011: 2016+A1:2017 Class A	Electrical Fast Transients EN 61000-4-4: 2012	
Current Harmonics EN 61000-3-2: 2014	Surge Immunity EN 61000-4-5: 2014	
Voltage Fluctuations EN 61000-3-3: 2013	Conducted Susceptibility EN 61000-4-6: 2014	
Electrostatic Discharge EN 61000-4-2: 2009	Power Frequency Magnetic Field EN 61000-4-8: 2010	
Radiated Immunity EN 61000-4-3: 2006+A2:2010	Voltage Dip/ Interruption EN 61000-4-11: 2004	

◎ **Safety**

Low Voltage Equipment Directive 2014/35/EU	
Safety Requirements	EN 61010-1: 2010 EN 61010-2-030: 2010

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