INSTRUCTION MANUAL

AC WITHSTANDING VOLTAGE TESTER
STW-9701

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"TEXIO" is the product brand name of our industrial electronic devices.

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CONTENTS

USING THE PRODUCT SAFELY

■ Preface

To use the product safely, read instruction manual to the end.   Before using this product, understand how to correctly use it.   If you read the manuals but you do not understand how to use it, ask us or your local dealer.   After you read the manuals, save it so that you can read it anytime as required.

■ Pictorial indication

The manuals and product show the warning and caution items required to safely use the product.   The following pictorial indication is provided.

Pictorial indication	
⚠	Some part of this product or the manuals may show this pictorial indication. In this case, if the product is incorrectly used in that part, a serious danger may be brought about on the user's body or the product. To use the part with this pictorial indication, be sure to refer to the manuals.
⚠ WARNING	If you use the product, ignoring this indication, you may get killed or seriously injured. This indication shows that the warning item to avoid the danger is provided.
⚠ CAUTION	If you incorrectly use the product, ignoring this indication, you may get slightly injured or the product may be damaged. This indication shows that the caution item to avoid the danger is provided.

Please be informed that we are not responsible for any damages to the user or to the third person, arising from malfunctions or other failures due to wrong use of the product or incorrect operation, except such responsibility for damages as required by law.

USING THE PRODUCT SAFELY

WARNING **CAUTION**

■ **Do not remove the product's covers and panels**
Never remove the product's covers and panels for any purpose.
Otherwise, the user's electric shock or fire may be incurred.

■ **Warning on using the product**
Warning items given below are to avoid danger to user's body and life and avoid the damage or deterioration of the product.   Use the product, observing the following warning and caution items.

■ **Warning items on power supply**
● **Power supply voltage**
The rated power supply voltages of the product are 100VAC. The rated power supply voltage for each product should be confirmed by reading the label attached on the back of the product or by the "rated" column shown in the instruction manual.   The specification of power cord attached to the products is rated to 125VAC for all products which are designed to be used in the areas where commercial power supply voltage is not higher than 125VAC. Accordingly, you must change the power cord if you want to use the product at the power supply voltage higher than 125VAC. If you use the product without changing power cord to 250VAC rated one, electric shock or fire may be caused.   When you used the product equipped with power supply voltage switching system, please refer to the corresponding chapter in the instruction manuals of each product.

● **Power cord**
(IMPORTANT)   The attached power cord set can be used for this device only.
If the attached power cord is damaged, stop using the product and call us or your local dealer.   If the power cord is used without the damage being removed, an electric shock or fire may be caused.

● **Protective fuse**
If an input protective fuse is blown, the product does not operate.   For a product with external fuse holder, the fuse may be replaced.   As for how to replace the fuse, refer to the corresponding chapter in the instruction manual.   If no fuse replacement procedures are indicated, the user is not permitted to replace it.   In such case, keep the case closed and consult us or your local dealer.   If the fuse is incorrectly replaced, a fire may occur.

USING THE PRODUCT SAFELY

■ Warning item on Grounding
If the product has the GND terminal on the front or rear panel surface, be sure to ground the product to safely use it.

■ Warnings on Installation environment
● Operating temperature and humidity
Use the product within the operating temperature indicated in the "rating" temperature column.　If the product is used with the vents of the product blocked or in high ambient temperatures, a fire may occur.　Use the product within the operating humidity indicated in the "rating" humidity column. Watch out for condensation by a sharp humidity change such as transfer to a room with a different humidity.　Also, do not operate the product with wet hands.　Otherwise, an electric shock or fire may occur.

● Use in gas
Use in and around a place where an inflammable or explosive gas or steam is generated or stored may result in an explosion and fire.　Do not operate the product in such an environment.　Also, use in and around a place where a corrosive gas is generated or spreading causes a serious damage to the product.　Do not operate the product in such an environment.

● Installation place
Do not insert metal and inflammable materials into the product from its vent and spill water on it.　Otherwise, electric shock or fire may occur.

■ Do not let foreign matter in
Do not insert metal and inflammable materials into the product from its vent and spill water on it.　Otherwise, electric shock or fire may occur.

■ Warning item on abnormality while in use
If smoke or fire is generated from the product while in use, stop using the product, turn off the switch, and remove the power cord plug from the outlet. After confirming that no other devices catch fire, ask us or your local dealer.

USING THE PRODUCT SAFELY

■ Input / Output terminals

Maximum input to terminal is specified to prevent the product from being damaged.   Do not supply input, exceeding the specifications that are indicated in the "Rating" column in the instruction manual of the product.   Also, do not supply power to the output terminals from the outside.   Otherwise, a product failure is caused.

■ Calibration

Although the performance and specifications of the product are checked under strict quality control during shipment from the factory, they may be deviated more or less by deterioration of parts due to their aging or others.

It is recommended to periodically calibrate the product so that it is used with its performance and specifications stable.   For consultation about the product calibration, ask us or your local dealer.

■ Daily Maintenance

When you clean off the dirt of the product covers, panels, and knobs, avoid solvents such as thinner and benzene.   Otherwise, the paint may peel off or resin surface may be affected.   To wipe off the covers, panels, and knobs, use a soft cloth with neutral detergent in it.

During cleaning, be careful that water, detergents, or other foreign matters do not get into the product.

If a liquid or metal gets into the product, an electric shock and fire are caused.

During cleaning, remove the power cord plug from the outlet.

Use the product correctly and safely, observing the above warning and caution items.   Because the instruction manual indicates caution items even in individual items, observe those caution items to correctly use the product.

If you have questions or comments about the manuals, ask us or E-Mail us.

1. GETING STARTED

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

1.1 STW-9701 Overview

As the STW-9701 is dedicated solely to AC withstanding tests, operation is simple and efficient. There are two voltage ranges, 2.5kV and 5kV with an upper current cutoff of 110mA AC (500VA output max).

The STW-9701 includes the basic current cutoff window detection, test timer, arc mode, pass hold, max mode and ground mode settings.

The STW-9701 can also store up to 100 different manual test conditions allowing the safety tester to accommodate any number of safety standards, including IEC, EN, UL, CSA, GB, JIS and others.

1.2 Main Features

Performance	• ACW: 2.5/5.0kVAC
Features	• 100 test conditions
	• Zero-Start crossing
	• Over temperature, voltage and current protection
	• Pass, Fail, Test, High Voltage and Ready indicators
	• Interlock (configurable)
Interface	• Remote control start/stop interface terminal
	• USB and RS-232C interface for programming
	• Signal I/O port for pass/fail/test monitoring and start/stop control/interlock

1.3   Accessories

Standard Accessories	Part number	Description
	GHT-114	Test lead
	Power cord	Region dependent
	N/A	Remote terminal male plug
	N/A	Interlock key
	N/A	Accessories CD
Optional Accessories	Part number	Description
	GHT-205	High Voltage Test Probe
	GHT-113	High Voltage Test Pistol
	GTL-232	RS-232C cable
	GTL-247	USB cable

1.4   Package Contents

Check the contents before using the STW-9701.

Opening the box
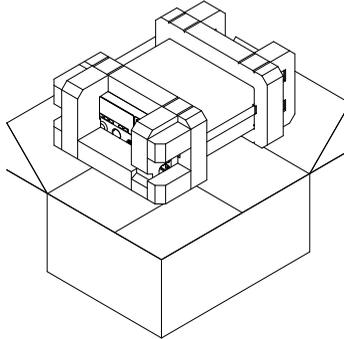
Contents (single unit)	• STW-9701 unit • Accessories CD (Instruction manual, USB Driver) • Power cord x1 (region dependent) • GHT-114 test leads x1 • Remote terminal male plug • Interlock key
⚠ Note	Keep the packaging, including the box, polystyrene foam and plastic envelopes should the need arise to return the unit to TEXIO TECHNOLOGY.
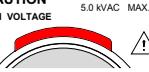
1.5 Appearance

1.5.1 Front Panel

Display	240 X 64 dot matrix display (LCD)	
Function keys	The function keys correspond to the soft-keys directly above on the main display.	
Pass/Fail indicators	PASS FAIL	The PASS and FAIL indicators light up upon a PASS or FAIL test result at the end of a manual test or automatic test.
ESC key	ESC	The ESC key is used to exit out of a menu or cancel a setting.
FIELD key	FIELD	The FIELD key is used to cycle between setting items when the tester is in the EDIT status or when in the Utility menu.
Directional arrow keys		The directional arrow keys are used to navigate menus and parameter settings.
READY indicator	READY	The READY indicator is lit when the tester is ready to begin testing. The STOP button is used to put the tester into READY status.
TEST indicator	TEST	The TEST indicator is lit when a test is on. The START button is used to put the tester into TEST status.
HIGH VOLTAGE indicator	CAUTION HIGH VOLTAGE 5.0 kVAC MAX.	The HIGH VOLTAGE indicator will light up when an output terminal is active. Only after the test has finished or stopped will the indicator turn off.
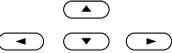
| HIGH VOLTAGE output terminal | **CAUTION** **HIGH VOLTAGE** 5.0 kVAC MAX. | The HIGH VOLTAGE terminal output is used for outputting the testing voltage. The terminal is recessed for safety. This terminal is used in conjunction with the RETURN terminal. |
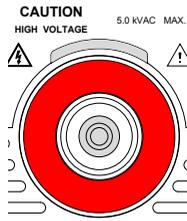
⚠ **WARNING**   USE EXTREME CAUTION.
Do not touch the HIGH VOLTAGE terminal during testing.

RETURN terminal	RETURN	The RETURN terminal is used for ACW tests.
Voltage knob		The voltage knob is used to edit voltage values.
SAVE key	SAVE	The SAVE key is used to save settings and menu parameters.
EDIT key	EDIT	Used to enter the EDIT status. In the EDIT status manual tests can be created, edited and saved. All parameters for a given manual test are edited in the EDIT status.
UTILITY key	UTILITY	Used to enter the MANU Utility (EDIT Status) or Common Utility menu (READY Status).
REMOTE terminal	REMOTE	The REMOTE terminal is used to connect to a remote controller.
STOP button	STOP	The STOP button is used to stop/cancel tests. The STOP button will also put the safety tester back into the READY status if a test has been stopped or if the panel keys are locked.
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.
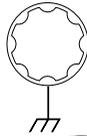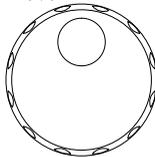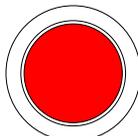
4
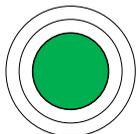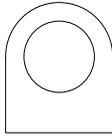
POWER switch   POWER   Turns the power on. The safety tester will always start up with the last test setting from when the instrument was last powered down.

1.5.2 Rear Panel

RS232 port   USB A port   GND

SIGNAL I/O   Fuse   Line voltage input
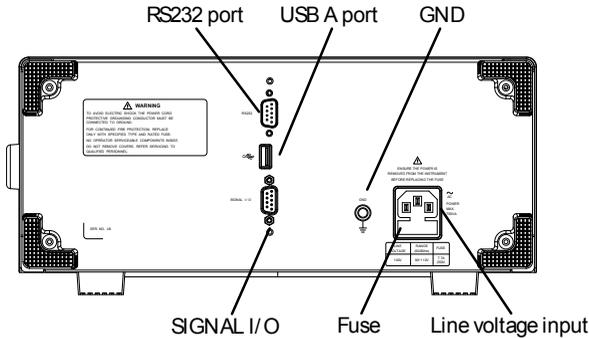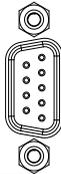
SIGNAL I/O port	SIGNAL I/O	The SIGNAL I/O port is used to monitor the tester status (PASS, FAIL, TEST) and input (START/ STOP signals). It is also used with the Interlock key.
USB A port		Used for remote control.
RS-232C interface port	RS232	Used for remote control and firmware updates.
GND	GND	Connect the GND (ground) terminal to the earth ground.
Line voltage input		Line voltage input: 100VAC ±10%
Line voltage fuse		Line voltage fuse: T7A 250V
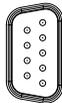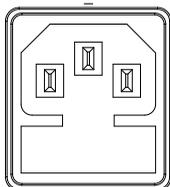
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1.6 Set Up

1.6.1 Line Voltage Connection and Power Up

Background	Before powering up the STW-9701 ensure the correct voltage is input into the AC input. Only 100VAC ±10% is accepted.
Steps	1. Check the fuse in the fuse holder. Page 50
	2. Connect the power cord to the AC voltage input.
	3. If the power cord does not have an earth ground, ensure the ground terminal is connected to an earth ground.
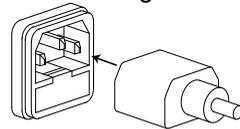
GND

⚠ Warning	Ensure the power cord is connected to an earth ground. Failure could be harmful to the operator and instrument.

4. Press the Power button.

POWER
▪ I ▪ O

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

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

```
SYSTEM SELF TEST
System Checking...
Hardware Checking...
Firmware Checking...
■■■■■■■■■■■■■■■■■■■■■■■■■■■■■
```

After the System Self Test completes, the tester will go into READY status and be ready to operate.

READY status

```
MANU=001        NAME 001      REF#=0.000mA
HI=0.900mA      LO=0.000mA
         kV            mA    READY
                             TIMER=001.0S
 ACW                 2.5kV 77
```
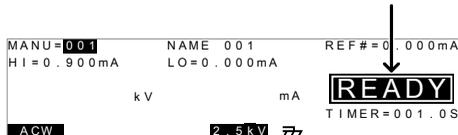
1.6.2 Workplace Precautions

Background	The STW-9701 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 STW-9701 generates voltages in excess of 5kVAC. Follow all safety precautions, warnings and directions given in the following section when using the instrument.

1. Only technically qualified personnel should be allowed to operate the safety tester.
2. The operating workplace must be fully isolated, especially when the instrument is in operation. The instrument should be clearly labeled with appropriate warning signage.
3. The operator should not wear any conductive materials, jewelry, badges, or other items, such wrist watches.
4. The operator should wear insulation gloves for high voltage protection.
5. Ensure the earth ground of the line voltage is properly grounded.
6. Ensure any devices that are adversely affected by magnetic fields are not placed near the tester.

1.6.3 Operating Precautions

Background	The STW-9701 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 STW-9701 generates voltages of up to 5kVAC. Follow all safety precautions, warnings and directions given in the following section when using the instrument.

1. Never touch the safety tester, lead wires, terminals, probes and other connected equipment when the tester is testing.
2. Do not turn the safety tester on and off quickly or repeatedly. When turning the power off, please allow a few moments before turning the power back on. This will allow the protection circuits to properly initialize.
   Do not turn the power off when a test is running, unless in an emergency.
3. Only use those test leads supplied with the instrument. Leads with inappropriate gauges can be dangerous to both the operator and the instrument.

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 terminals before the start of a test. Keep the test leads disconnected at all other times.
7. Always press the STOP button when pausing testing.
8. Do not leave the safety tester unattended. Always turn the power off when leaving the testing area.
9. When remotely controlling the safety tester, ensure adequate safety measures are in place to prevent:

- Inadvertent output of the test voltage.
- Accidental contact with the instrument during testing. Ensure that the instrument and DUT are fully isolated when the instrument is remotely controlled.

1.6.4 Basic Safety Checks

Background	The STW-9701 is a high voltage device and as such, daily safety checks should be made to ensure safe operation.
	1. Ensure all test leads are not broken and are free from defects such as cracks or splitting.
	2. Ensure the safety tester is always connected to an earth ground.
	3. Test the safety tester operation with a low voltage/current output: Ensure the safety tester generates a FAIL judgment when the HIGH VOLTAGE and RETURN terminals are shorted (using the lowest voltage/current as the testing parameters).
⚠ WARNING	Do not use high voltages/currents when the HIGH VOLTAGE and RETURN terminals are shorted. It may result in damage to the instrument.

2. OPERATION

2.1   Status Modes

This section describes the overall structure of the operating modes for the STW-9701 safety tester. The tester has 6 status modes: (EDIT, READY, TEST, STOP, FAIL, PASS). The flow chart below describes how to navigate from mode to mode.

2.1.1   Operation Flow Chart
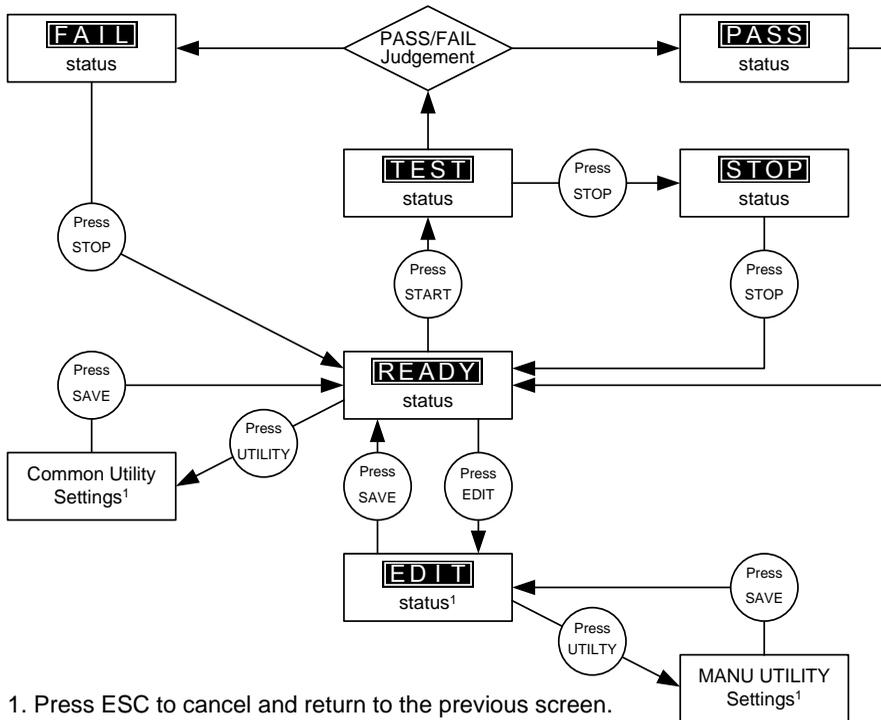
1. Press ESC to cancel and return to the previous screen.

2.1.2   Status Modes Overview

READY Status   READY status is the default mode when the tester is
turned on. When the tester is in READY status, it is
ready to begin testing. Pressing the START button
will begin testing and put the tester into TEST status.
Pressing the EDIT key when in READY status will
put the tester into EDIT status.
Manual tests are selected when the tester is in
READY status.

READY status

```
MANU= 0 0 1        NAME  0 0 1        REF#=0.000mA
HI=0.900mA        LO=0.000mA

              k V                mA     READY
                                        TIMER=001.0S
ACW                      2.5KV  ⏚
```
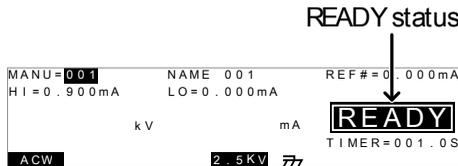
EDIT Status   EDIT status is accessed by pressing the EDIT key
when in READY status. EDIT status is used to edit
the currently selected manual test. Pressing the
SAVE key will save any changes. Pressing the ESC
key will cancel any changes.

EDIT status

```
MANU=0 0 1        NAME  0 0 1        REF#=0.000mA
HI=0.900mA        LO=0.000mA

              k V                mA     EDIT
                                        TIMER=001.0S
ACW                      2.5kV  ⏚     HI/LO  TIMER
```
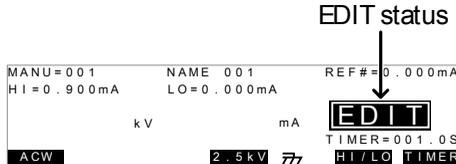
TEST Status   TEST status is active when a test is running.
Pressing STOP will stop the test.

TEST status

```
MANU=0 0 1        NAME  0 0 1        REF#=0.000mA
HI=1.001mA        LO=0.000mA

  1.000 k V   0.100 mA    TEST
                                        TIMER=001.0S
ACW                      2.5kV  ⏚
```
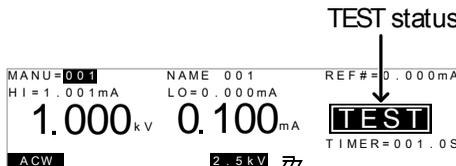
STOP Status	STOP status is shown when a test did not finish running and has been stopped by the operator. Pressing STOP will return the tester to READY status.

STOP status

```
MANU=001        NAME  001        REF#=0.000mA
HI=1.001mA      LO=0.000mA
    1.968kV   0.000mA        STOP
                                 TIMER=001.0S
 ACW                 2.5kV
```

PASS/FAIL Status	When the tester is allowed to run to completion, the test result is shown as a PASS or FAIL. The screen will show PASS or FAIL on the screen and the PASS or FAIL indicators will light up.

PASS status

```
MANU=001        NAME  001        REF#=0.000mA
HI=0.201mA      LO=0.100mA
    1.968kV   0.040mA        PASS
                                 TIMER=001.0S
 ACW                 2.5kV
```

FAIL status

```
MANU=001        NAME  001        REF#=0.000mA
HI=1.001mA      LO=0.000mA
    1.968kV   0.040mA        FAIL
                                 TIMER=001.0S
 ACW                 2.5kV
```

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

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

 LCD    BUZZ  INTER CTRL          ◄      ►
```

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

```
MANU=001        MANU UTILITY
ARC   MODE:OFF
PASS  HOLD:OFF
MAX   HOLD:OFF
GROUND  MODE:ON
```

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2.2 Test Lead Connection

This section describes how to connect the STW-9701 to a DUT for withstanding tests.

2.2.1 ACW Connection

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

ACW Connection
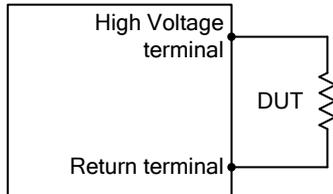
Steps	1. Turn the power off on the safety tester.
	2. Connect the high voltage test lead(red) to the HIGH VOLTAGE terminal and screw firmly into place.
	3. Connect the return test lead(white) into the RETURN terminal and screw the protector bar into place, as shown below.
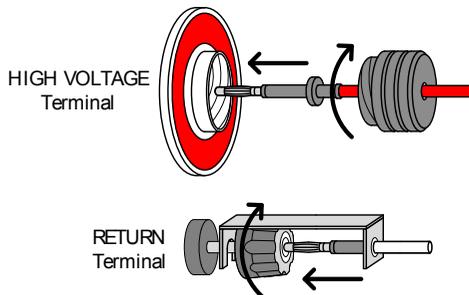
2.3 ACW Testing

This section describes how to create, edit and run a ACW safety test. Each setting described in this chapter *only applies to the selected* MANU test number – *no other tests are affected.*
Each MANU test can be stored/recalled to/from one of 100 memory locations.

Before operating the STW-9701 please read the safety precautions as outlined in the Set Up chapter on page 6.

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2.3.1   Choose/Recall a Manual Test Number

Background	MANU test numbers 001 to 100 can be saved and thus be loaded when editing/creating a MANU test.
Steps	1. Make sure the tester is in the READY status. The tester will be in the READY status after power-up. See page 6 for details.
	2. Use the arrow keys to select a MANU test number.

MANU #   001~100

MANU number   READY status

```
MANU= 001        NAME  001        REF#=0.000mA
HI=0.900mA        LO=0.000mA

             kV              mA    READY
                                   TIMER=001.0S
  ACW                2.5KV
```
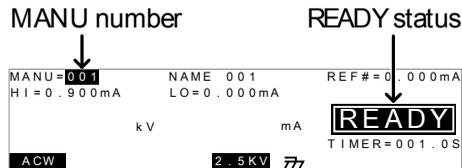
⚠ Note	The MANU number can only be chosen in READY status. If in the EDIT status, switch to the READY status by pressing the SAVE key to save or the ESC key twice to cancel editing.

2.3.2   Edit Manual Test Settings

Background	To edit any of the manual test settings, the tester must be in EDIT status. Any settings or parameters that are edited only apply to the currently selected MANU number.
Steps	1. Press the EDIT key when in READY status. This will enter EDIT status for *the currently selected test number only*. See page 13 for details.

EDIT

READY status

```
MANU=001          NAME  001        REF#=0.000mA
HI=0.900mA        LO=0.000mA

             kV              mA    EDIT
                                   TIMER=001.0S
  ACW                2.5kV         HI/LO  TIMER
```
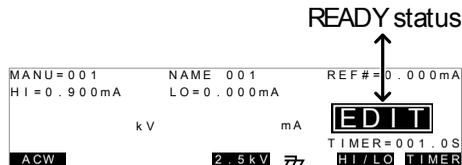
2. The test NAME, REF# value, HI limit, LO limit, TIMER and ARC(if activated) settings can all be edited in EDIT status. See the following sections for details.

⚠ Note	Pressing the SAVE key will save the settings for the current test and return back to READY status. Pressing the ESC key twice will cancel any changes and return to READY status.

2.3.3 Setting the Voltage Range

Background	There are only 2 voltage ranges, 2.5kV and 5.0kV. The voltage range can only be set when in the EDIT status.
Steps	1. Make sure the tester is in EDIT status. 2. Press the 5.0kV key or 2.5kV key to toggle the range.(soft-key) ⬜ 5.0kV Range 5.0kV,2.5kV

2.3.4 Setting the Upper and Lower Limits

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

Steps	1. Make sure the tester is in EDIT status.
	2. Press the FIELD key repeatedly (FIELD) until the cursor is positioned on the HI setting.
	3. Use the arrow keys to edit the HI limit.
	   HI range 0.001mA~110.0mA
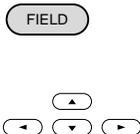	
	   HI settings LO settings

MANU= U 1   N A M E   U 1   R E F # = 0 . 0 0 0 mA
H I = 0 . 9 0 0 mA   L O = 0 . 0 0 0 mA

                              k V   mA | E D I T |
                                                                    T I M E R = 0 0 1 . 0 S
        A C W   2 . 5 k V ⏚   H I / L O   T I M E R
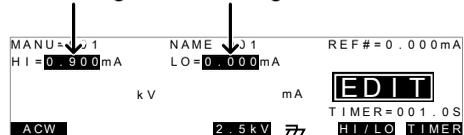
	4. Repeat the steps for the LO setting. LO range 0.000mA~109.9mA
⚠ Note	The LO SET setting is limited by the HI SET setting. The LO SET limit cannot be greater than the HI SET limit. When setting the current, be aware that a maximum of 500VA can be set for ACW.

2.3.5 Setting a Reference Value

Background	The REF# acts as an offset. The REF# value is subtracted from the measured current.
Steps	1. Make sure the tester is in EDIT status.
	2. Press the FIELD key repeatedly (FIELD) until the cursor is positioned on the #REF setting.

REF# settings
↓

```
MANU = 0 0 1          NAME  0 0 1         R E F # = 0 . 0 0 0 mA
H I = 0 . 9 0 0 mA         LO = 0 . 0 0 0 mA

                     k V               m A      E D I T
                                              T I M E R = 0 0 1 . 0 S
  A C W                        2 . 5 k V  ⏚    H I / L O  T I M E R
```
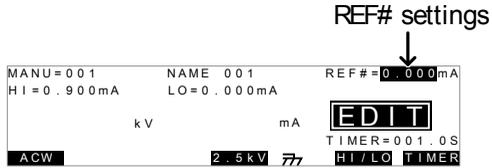
3. Use the arrow keys to edit the REF# value.

ACW   0.000mA~HI SET current -1 count

2.3.6 Setting the Test Time (Timer)

Background	The TIMER setting is used to set the test time for the current test. The test time determines how long the test voltage or current is applied to the DUT. This test time does not include the time required for zero crossing to be set up. The test time can be set from 0.5 seconds to 999.9 seconds with a resolution of 0.1 seconds. The test time can also be turned off so that a test can be run continuously.
	The Set up time is up to 150ms for each test. The zero crossing can be a positive or negative start. The total discharge time depends on the capacitance of the DUT and test voltage.
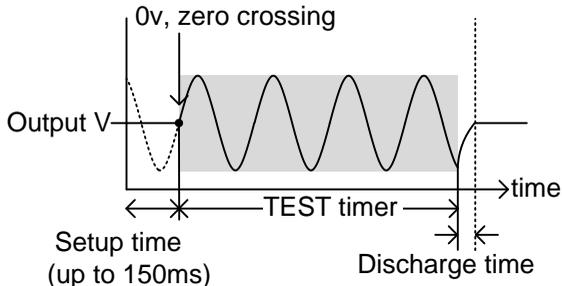
| Setting the Test Time (0.5~999.9S) | 1. Make sure the tester is in EDIT status. |
| | 2. Press the FIELD key repeatedly until the cursor is positioned on the TIMER setting or press the TIMER soft-key. (FIELD) OR TIMER |

Timer settings

```
MANU=001        NAME  001       REF#=0.000mA
HI=0.900mA      LO=0.000mA
              kV              mA    EDIT
                                   TIMER=001.0S
  ACW                  2.5kV  ⏚   HI/LO TIMER
```
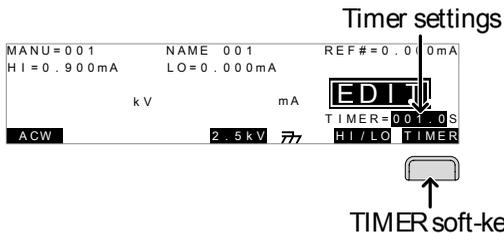
TIMER soft-key

3. Use the arrow keys to edit the TIMER setting
   TIMER   000.5s~999.9s

| Turning the Test Time Off | 1. Hold the TIMER soft-key for at least 3 seconds to turn the timer off or on. TIMER |

Timer settings

```
MANU=001        NAME  001       REF#=0.000mA
HI=0.900mA      LO=0.000mA
              kV              mA    EDIT
                                   TIMER=OFF
  ACW                  2.5kV  ⏚   HI/LO TIMER
```
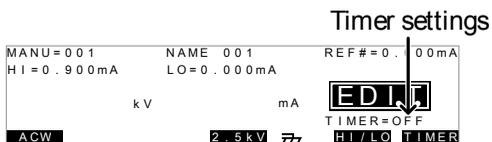
2.3.7   Creating a MANU Test File Name

| Background | Each test can have a user-defined test file name (default: NAME_XXX__) up to 10 characters long. See the character list below for the allowed characters. The first four characters can be alphabetical characters only (A~Z, Space character) The last 6 characters can only be numbers (0~9, space character) |

Character List

```
A B C D E F
G H I J K L
M N O P Q R    0 1 2 3 4 5
S T U V W X    6 7 8 9
Y Z
```

```
MANU = 001          NAME   001          REF # = 0 . 000 mA
HI = 0 . 900 mA     LO = 0 . 000 mA

           k V                    m A        EDIT
                                          TIMER = OFF
   ACW                    .5 kV  ⏚    HI / LO  TIMER
```
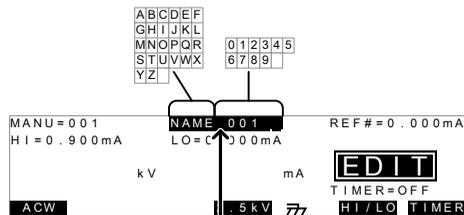
Test name settings

Steps	1. Press the FIELD key repeatedly until the cursor is positioned on the test NAME setting.	FIELD

Test name setting

```
MANU = 001          NAME   001          REF # = 0 . 000 mA
HI = 0 . 900 mA     LO = 0 . 000 mA

           k V                    m A        EDIT
                                          TIMER = OFF
   ACW                   2 . 5 kV  ⏚   HI / LO  TIMER
```
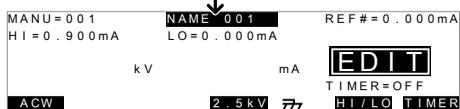
2. Use the arrow keys to set the test name for the current test.

⬆ ⬅ ⬇ ➡

3. The test file name is set when the current test setting is saved.

2.3.8 Setting the ARC Mode

Background	ARC detection, otherwise known as flashover detection, detects fast voltage or current transients that are not normally detected. Arcing is usually an indicator of poor withstanding insulation, electrode gaps or other insulating problems that cause temporary spikes in current or voltage during ACW. There are three ARC detection settings: OFF, ON AND CONTINUE, ON AND STOP. The ON AND CONTINUE setting will detect arcs over the ARC current level and continue the test, the ON AND STOP setting will stop the test when an arc is detected.
Steps	1. Press the UTILITY key on the front panel when the tester is in the EDIT status. The tester will go to the MANU Utility for the *current test*.

UTILITY

```
MANU = 001       MANU  UTILITY
ARC    MODE : OFF
PASS  HOLD : OFF
MAX    HOLD : OFF
GROUND  MODE : ON
```

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

2. Press the FIELD key repeatedly until the cursor is positioned on the ARC MODE setting.   (FIELD)

3. Use the UP and DOWN arrow keys to set the ARC MODE.   (▲) (▼)

ARC MODES: OFF, ON AND CONTINUE, ON AND STOP

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

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

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

6. Press the FIELD key repeatedly until the cursor is positioned on the ARC setting.   (FIELD)

7. Use the arrow keys to edit the ARC level.   (▲) (◄) (▼) (►)

ARC   2.000mA~200.0mA

ARC setting

```
MANU=001      NAME  001      REF#=0.000mA
HI=0.900mA    LO=0.000mA     ARC=2.000mA
              kV             mA    ┌─────────┐
                                   │ E D I T │
                                   └─────────┘
                             TIMER=001.0S
 ACW              2.5kV  ⏚   HI/LO  TIMER
```
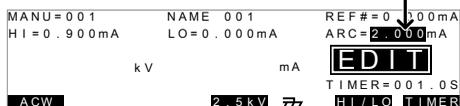
⚠ Note	The ARC setting range is directly related to the HI SET current limit.

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

2.3.9 Setting PASS HOLD

Background	When the PASS HOLD setting is set to ON, a PASS judgment is held until the STOP button is pressed.
Steps	1. Press the UTILITY key on the front panel when the tester is in EDIT status. The tester will enter the MANU Utility menu for *the current test only*. UTILITY

```
MANU=001        MANU  UTILITY
ARC   MODE:OFF
PASS  HOLD:OFF
MAX   HOLD:OFF
GROUND  MODE:ON
```

⚠ Note	The MANU UTILITY settings only apply to the currently selected MANU test.
	2. Press the FIELD key repeatedly until the cursor is positioned on the PASS HOLD setting. FIELD
	3. Use the UP/DOWN arrow keys to set the PASS HOLD setting. ▲ ▼
	PASS HOLD OFF, ON
	4. Press the SAVE key to save and exit the MANU Utility menu. SAVE
⚠ Note	The ESC key can be pressed at any time in the MANU Utility menu to cancel and exit.

2.3.10 Setting MAX HOLD

Background	The MAX HOLD setting will hold the maximum current measured in the ACW test.
Steps	1. Press the UTILITY key on the front panel when the tester is in EDIT status. The tester will enter the MANU Utility menu for *the current test only*. UTILITY

```
MANU=001        MANU  UTILITY
ARC   MODE:OFF
PASS  HOLD:OFF
MAX   HOLD:OFF
GROUND  MODE:ON
```

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

2. Press the FIELD key repeatedly until the cursor is positioned on the MAX HOLD setting.	FIELD	
3. Use the UP/DOWN arrow keys to set the MAX HOLD setting.	▲	
	▼	
MAX HOLD OFF, ON		
4. Press the SAVE key to save and exit the MANU Utility menu.	SAVE	
⚠ Note	The ESC key can be pressed at any time in the MANU Utility menu to cancel and exit.	

2.3.11 Setting the Grounding Mode

Background   When GROUND MODE is set to ON, the STW-9701 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.
GROUND MODE = ON, DUT grounded
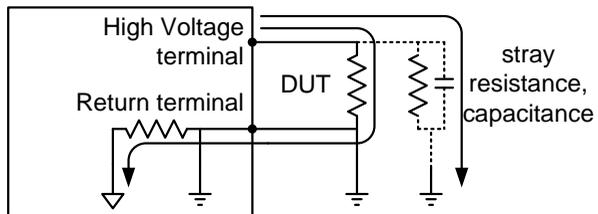
GROUND MODE = ON, DUT floating
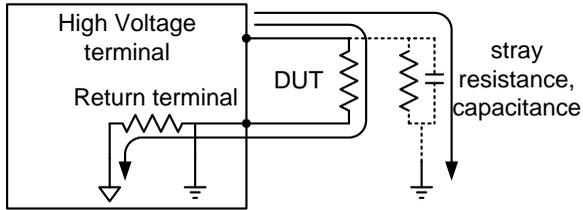
GROUND MODE = OFF, DUT floating
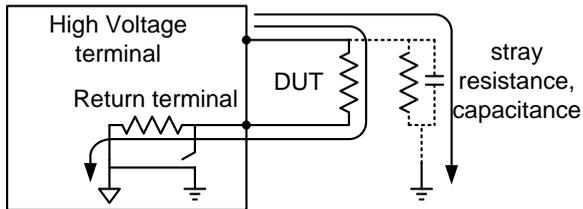
GROUND MODE = OFF, DUT grounded
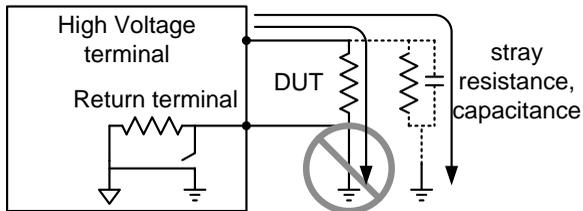
⚠ Warning	When GROUND MODE is set to OFF, the DUT, fixtures or connected instrumentation cannot be grounded. This will short circuit the internal circuitry during a test.
	If it is not known whether the DUT test setup is grounded or not, always set GROUND MODE to ON. Only set GROUND MODE to OFF when the DUT is floating electrically.
Steps	1. Press the UTILITY key on the front panel when the tester is in EDIT status. The tester will enter the MANU Utility menu for *the current test only*.

UTILITY

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

<table>
<tr><td>⚠ Note</td><td>The MANU UTILITY settings only apply to the selected MANU test.</td></tr>
</table>

FIELD

2. Press the FIELD key repeatedly until the cursor is positioned on the GROUND MODE setting.

3. Use the UP/DOWN arrow keys to set the GROUND MODE setting.

   ▲ ▼

   GROUND MODE OFF, ON

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

   SAVE

5. The GROUND MODE icon on the display changes accordingly.

```
001          REF#=
.000mA

        mA   ED
             TIMER
2.5kV  ⏚   HI/L
```

```
001          REF#=
.000mA

        mA   ED
             TIMER
2.5kV  ⏚   HI/L
```

GROUND
MODE = OFF

GROUND
MODE = ON

<table>
<tr><td>⚠ Note</td><td>The ESC key can be pressed at any time in the MANU Utility menu to cancel and exit.</td></tr>
</table>

2.3.12 Saving and Exiting EDIT Status

Background	After all test parameters have been set, the test can be saved. After a test is saved it can then be run.
Steps	6. When in EDIT status, press the SAVE key to save the current test. This will return the tester to the READY status for the current test number.

SAVE

READY status

```
MANU=001        NAME 001       REF#=0.000mA
HI=0.900mA      LO=0.000mA
                                 READY
         kV          mA
                               TIMER=001.0S
ACW                 5.0kV ⏚
```

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

2.3.13 Setting the Test Voltage and Running a MANU Test

Background	A test can be run when the tester is in READY status. The test voltage can be set when the test is running.
⚠ Note	The tester cannot start to run a test under the following conditions: • The INTERLOCK function is ON and the Interlock key is not inserted in the signal I/O port (page 34). • 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).
Steps	1. Connect the DUT to the tester. Page 12 2. Ensure the tester is in READY status and that all the testing parameters have been set for the current test (MANU test number).

MANU number   READY status


```
MANU = 0 0 1        NAME   0 0 1        REF # = 0 . 0 0 0 m A
H I = 0 . 9 0 0 m A      L O = 0 . 0 0 0 m A
                                        ╔═══════╗
               k V                m A   ║ READY ║
                                        ╚═══════╝
                                        T I M E R = 0 0 1 . 0 S
  ACW                      2 . 5 K V
```
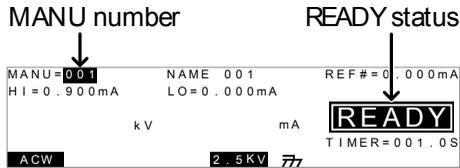
3. The READY indicator will be lit blue when in the READY status.   **READY**

4. Turn the voltage knob counter-clockwise to the end to set the test voltage to 0V.

START

5. Press the START button. The test starts automatically and the tester goes into the TEST status.

6. The TEST indicator will be lit orange when in the TEST status.   **TEST**
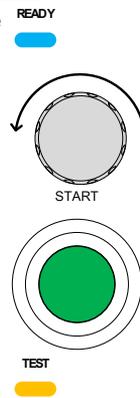
7. The test will start by showing the remaining test time. The test will continue until the test is finished or the test is stopped.

8. Use the voltage knob to set the test voltage.

Example

ACW   0.100kV ~ 5kV

Measured Current

Test Voltage   TEST status

```
MANU= 0  1            NAME  001        REF#=0.000mA
HI=1.0 1 imA          LO=0.  0mA
```
1.000 k V   **0.100** mA   **TEST**

ACW   2.5kV ⏚   TIMER=001.0S
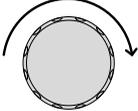
remaining TIMER time
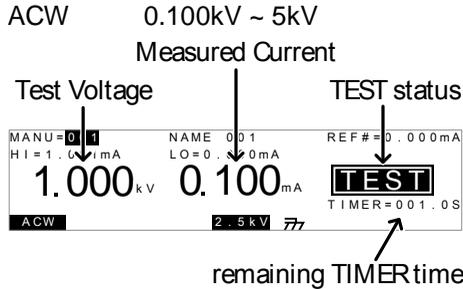
⚠ Note	The test voltage can be set lower than 0.100kV, however the specifications are not guaranteed for test voltages less than 0.100kV.
Stop the Test	1. To stop the test at any time when it is running, press the STOP button. The test will stop immediately. When the STOP button is pressed, a judgment is not made on the test. All panel keys except the STOP button are locked when the tester is in STOP status.

STOP

Example

STOP status

```
MANU= 001             NAME  001        REF#=0.000mA
HI=1.001mA            LO=0.000mA
```
1.968 k V   **0.000** mA   **STOP**

ACW   2.5kV ⏚   TIMER=001.0S
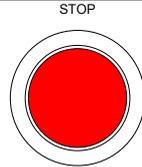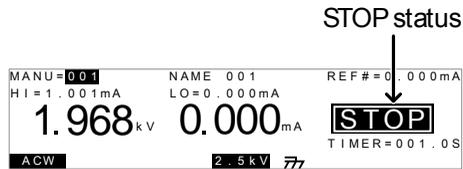
2. To put the tester back into READY status, press the STOP button again.
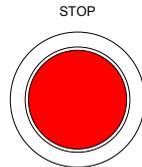
STOP

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

2.3.14   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.

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


```
MANU=001        NAME  001        REF#=0.000mA
HI=0.201mA      LO=0.100mA
   1.968kV  0.040mA   PASS
                                 TIMER=001.0S
 ACW                  2.5kV  ⏚
```

2. The PASS judgment will be held on the display until the STOP or START button is pressed.

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

STOP
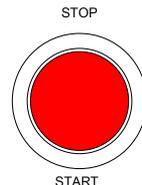
Pressing the START button will restart the test.
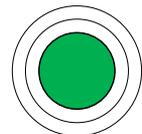
START

⚠ Note	The buzzer will only sound if the Pass Sound is set to ON. See page 28 for details. The START button is disabled when the buzzer is beeping.
PASS Timing Diagrams	The timing diagrams below show the ACW timing for the START status, TEST status and PASS judgment.

ACW PASS
Timing

0.2s−999.9s Depending on the buzzer time setting.

PASS HOLD OFF

START
TEST

PASS HOLD ON
BUZZER

Output V

time

TEST timer

Setup time
(up to 150ms)

PASS time
(~150ms)
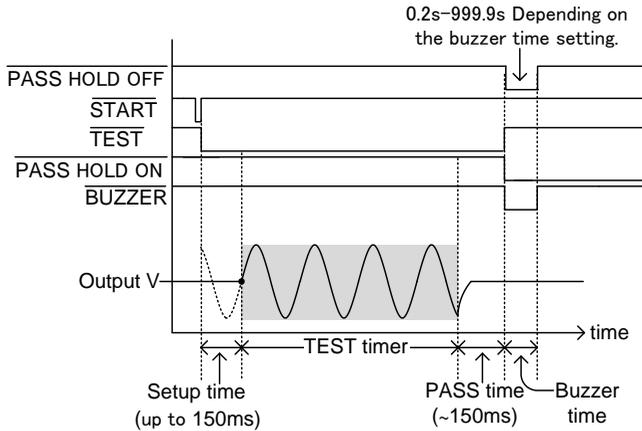
Buzzer
time

FAIL Judgment

1. When the test is judged as FAIL, FAIL will be displayed, the buzzer will sound and the FAIL indicator will be lit red.
As soon as a test is judged FAIL, power is cut from the terminals.

FAIL

MANU=001   NAME 001   REF#=0.000mA
HI=1.001mA   LO=0.000mA

1.968kV 0.040mA   FAIL
                                                    TIMER=001.0S
ACW   2.5kV

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

STOP

MANU=001   NAME 001   REF#=0.000mA
HI=0.900mA   LO=0.000mA

                kV   mA   READY
                                                    TIMER=001.0S
ACW   2.5KV
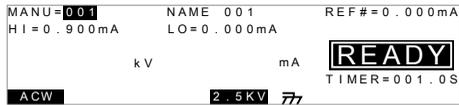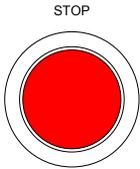
⚠ Note

The buzzer will only sound if Fail Sound is set to ON. See page 28 for details.

FAIL Timing Diagrams

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

26

ACW FAIL
Timing

| | Setup time
(up to 150ms) | | FAIL time
(~250ms) | Buzzer
time |
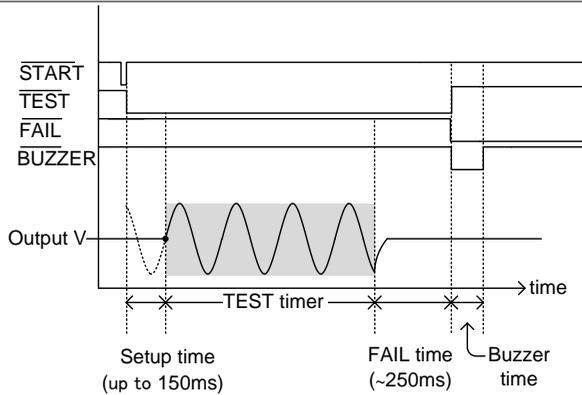
2.4 Common Utility Settings

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

The Common Utility menu includes the following settings:

2.4.1 LCD Settings

Description	The LCD settings include contrast and brightness controls.
Steps	1. Ensure the tester is in READY status. Page 9

```
MANU=001        NAME  001      REF#=0.000mA
HI=0.900mA      LO=0.000mA
                                    READY
          kV              mA
                                  TIMER=001.0S
 ACW                  2.5KV
```
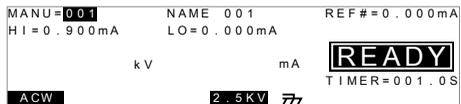
2. Press the UTILITY key.   UTILITY

3. Use the arrow soft-keys to go to the LCD utility (The STW-9701 will be in the LCD utility by default).

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

 LCD    BUZZ  INTER  CTRL        ◄      ►
```

LCD utility   Left and right soft-keys keys

4. Use the FIELD key to choose a menu item: LCD Contrast, LCD Brightness.   FIELD

5. Use the up and down arrow keys to set the chosen menu item.

▲

▼

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

6. Press SAVE to save the settings and exit to READY status.

SAVE

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

2.4.2   Buzzer Settings

Description	The Buzzer settings allow you to set whether the buzzer will sound for PASS/FAIL judgments. The buzzer time can also be set for the PASS/FAIL judgments.
Steps	1. Ensure the tester is in READY status.

Page 9

```
MANU=001          NAME 001      REF#=0.000mA
HI=0.900mA        LO=0.000mA
            kV              mA    READY
                                 TIMER=001.0S
 ACW                  2.5KV  ⏚
```
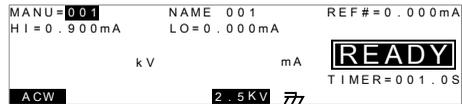
2. Press the UTILITY key.

UTILITY

3. Use the arrow soft-keys to go to the BUZZ utility.

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

LCD   BUZZ  INTER CTRL      ◀      ▶
```

BUZZ utility   Left and right arrow keys

4. Use the FIELD key to choose a menu item: Pass Sound, Fail Sound, TIME* (for Pass Sound), TIME (for Fail Sound).
   * The TIME settings for Pass Sound or Fail Sound can only be selected if they are turned on.

FIELD

5. Use the arrow keys to turn Pass Sound/Fail Sound on or off or to set their TIME parameters.

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| | Pass Sound | ON (000.2s~999.9s), OFF |
| | Fail Sound | ON (000.2s~999.9s), OFF |

6. Press SAVE to save the settings and exit to READY status.　　　SAVE

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

2.4.3　Interface Settings

| Description | The interface settings choose the remote interface configuration. USB or RS-232C can be selected. |

| Steps | 1. Ensure the tester is in READY status. | Page 9 |

```
MANU=001        NAME 001        REF#=0.000mA
HI=0.900mA      LO=0.000mA
           kV              mA      READY
                                  TIMER=001.0S
 ACW                  2.5KV  ⏚
```
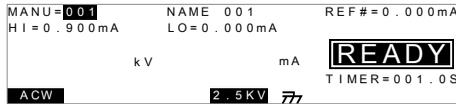
2. Press the UTILITY key.　　　UTILITY

3. Use the arrow soft-keys to go to the INTER utility.

```
        COMMON  UTILITY
Interface:RS232
Baud:  9600

 LCD    BUZZ  INTER  CTRL        ◄      ►
```

INTER utility　　　Left and right arrow keys

4. Use the Up or Down arrow keys to set the interface to USB or RS-232.　　　▲ ▼

5. If the interface is set to RS-232, use the FIELD key to go to the Baud setting.　　　FIELD

   Use the Up and Down arrow keys to set the baud rate.　　　▲ ▼

   | Baud | 9600, 19200, 38400, 57600, 115200 |

6. Press SAVE to save the settings and exit to READY status.　　　SAVE

| ⚠ Note | Ensure the baud rate setting matches the host machine setting. |

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

2.4.4   Control Settings

Description	The Control settings are accessed in the COMMON UTILITY menu. The Control settings include: Start Control, Double Action, Key Lock and Interlock. Start Control is used to determine how a test is started. Tests can be started via the front panel (START/STOP buttons), from a remote controller or via the SIGNAL I/O port.
	The Double Action function is a safety feature used to prevent accidentally starting a test. Normally to start a test, the START button is pressed when the tester is in READY status. To start a test when Double Action is ON, the STOP button must first be pressed, followed by the START button within 500ms.
	Key Lock disables the front panel keys from changing the test number, mode or testing parameters. Only the Utility menu and any keys required for testing are not disabled.
	The Interlock function is a safety feature. The interlock function prevents a test from running, unless the interlock pins on the signal I/O port connector are shorted. The included interlock key can be used for this purpose. See page 34 for details.

Steps	1. Ensure the tester is in READY status.	Page 9

```
MANU=001        NAME 001      REF#=0.000mA
HI=0.900mA      LO=0.000mA
                                          READY
          kV                mA
                                    TIMER=001.0S
 ACW                  2.5KV  ⏚
```
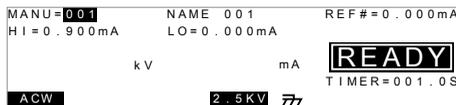
2. Press the UTILITY key.   UTILITY

3. Use the arrow soft-keys to go to the CTRL utility.

```
          COMMON  UTILITY
Start Ctrl:FRONT PANEL
Double Action:OFF
Key Lock:OFF        INTERLOCK:OFF
 LCD    BUZZ  INTER  CTRL          ◀    ▶
```

Control utility   Left and right arrow keys

4. Use the FIELD key to choose a menu item: Start Ctrl, Double Action, Key Lock or INTERLOCK.

FIELD

5. Use the arrow keys to select setting for the chosen menu item.

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

6. Press SAVE to save the settings and exit to READY status.

SAVE

⚠ Note | The Double Action setting is ignored when the STW-9701 is being controlled remotely using the USB or RS-232C interfaces.

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

Interlock open message

```
MANU=001        NAME 001        REF#=0.000mA
HI=0.900mA      LO=0.000mA
                INTERLOCK  OPEN
          kV              mA     READY
                                 TIMER=001.0S
  ACW            2.5KV  ⏚
```
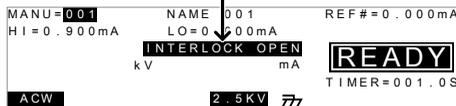
3. EXTERNAL CONTROL

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

3.1   Remote Terminal Overview

Overview	The REMOTE terminal connector is a standard 5-pin DIN terminal suitable for a remote controller.
⚠ WARNING	Keep any cables that are connected to the REMOTE terminal away from the HIGH VOLTAGE and RETURN terminals.
Pin Assignment and Connection	
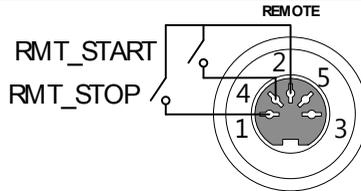
Pin	Pin name	Description
1	RMT_STOP	Remote Stop signal
2	COM	Common line
3	Not used	
4	RMT_START	Remote Start signal
5	Not used	
Signal Properties		
High level input voltage	2.4V~3.3V	
Low level input voltage	0~0.8V	
Input period	minimum of 1ms	

3.2   Remote Controller Operation

Description	The STW-9701 accepts external remote controllers with a START and STOP button. To use the REMOTE terminal, the STW-9701 must first be configured to accept a remote controller. Operating a remote controller is the same as operating the START and STOP buttons on the front panel.
Steps	1. Insert the lead of remote controller into the REMOTE terminal.

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

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

⚠ NOTE		Even if the STW-9701 is configured to use the REMOTE CONNECT option, the STOP button on the front panel can still be used to stop a test.

	4. To return the operation control to the front panel, configure the Start Ctrl option to FRONT PANEL.	Page 30

3.3 SIGNAL I/O Overview

Overview	The SIGNAL I/O port can be used to remotely start/stop tests and monitor the test status of the instrument. The SIGNAL I/O port is also used for the interlock function (page 30). The SIGNAL I/O port uses a DB-9 pin female connector.

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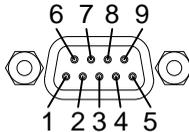
Pin name	Pin	Description
INTERLOCK1	1	When INTERLOCK is ON, a test is only allowed to start
INTERLOCK2	2	when both INTERLOCK pins are shorted.
INPUT_COM	3	Common input line
INPUT_START	4	Start signal input
INPUT_STOP	5	Stop signal input
OUTPUT_TEST	6	Indicates that a test is in progress
OUTPUT_FAIL	7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

Interlock connection	PIN 1 INTERLOCK1 PIN 2 INTERLOCK2
Input Connection	PIN 3 INPUT_COM PIN 4 INPUT_START PIN 5 INPUT_STOP
Output Connection	PIN 6 OUTPUT_TEST PIN 7 OUTPUT_FAIL PIN 8 OUTPUT_PASS PIN 9 OUTPUT_COM
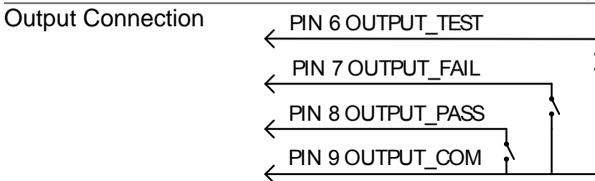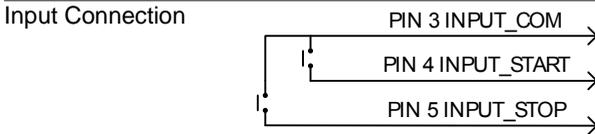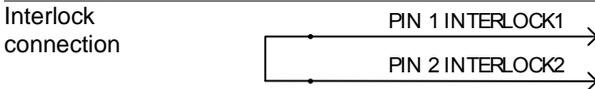
Signal Properties	Input Signals	
	High level input voltage	5V ~ 32V
	Low level input voltage	0V ~ 1V
	Low level input current	Maximum of -5mA
	Input period	Minimum of 1ms
	Output Signals	
	Output Type	Relay form A
	Output Rated Voltage	30VDC
	Maximum output current	0.5A

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

Background	To use the SIGNAL I/O port the Start Ctrl settings have to be set to SIGNAL I/O in the Common Utility menu.
Panel operation	1. Set the Start Ctrl option to SIGNAL I/O.
	2. Connect the Input/Output signals to the SIGNAL I/O port.
	3. To start the testing, short the INPUT_STOP and INPUT_COM line for a minimum of 1ms to put the tester into READY status.
	4. To start the testing, short the INPUT_START and INPUT_COM lines for a minimum of 1ms.
	5. To stop the testing, temporarily short the INPUT_STOP and INPUT_COM line again.
⚠ NOTE	Even if the STW-9701 is configured to use the SIGNAL I/O interface, the STOP button on the front panel can still be used to stop a test.

3.5 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 33 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 Common Utility.
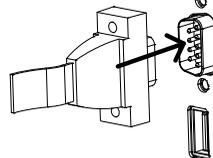
⚠️ Note	With INTERLOCK set to ON, the tester can now only start a test when the Interlock key is connected. Do not remove the interlock after starting a test. It must be connected after a test has started or is running. Set INTERLOCK to OFF to disable this feature.

4. REMOTE CONTROL

This chapter describes basic configuration of IEEE488.2 based remote control. The remote interface supports USB and RS-232C.

4.1 Interface Configuration

4.1.1 USB Remote Interface

USB Configuration	PC side connector	Type A, host
	STW-9701 side connector	Rear panel Type A
	USB Class	Virtual COM Port (CP2102:Silicon Laboratories)
Panel operation	1. Connect the USB cable to the rear panel USB A port.	
	2. Set the interface to USB from the Common Utility menu.	Page 29
⚠ Note	When USB is used for remote control, an RS-232C port is simulated. RS-232C settings is fixed (115200bps, 8bit, stop:1bit, Parity:None).	

4.1.2 RS-232C Remote Interface

RS-232 CConfiguration	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
		2: RxD (Receive Data)
		3: TxD (Transmit Data)
		4: No connection
		5: GND
		6,7,8,9: No connection

Connection	PC		STW-9XXX	
	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 RS-232C port.	RS232
	2. Set the interface to RS-232C from the Common Utility menu.	Page 29
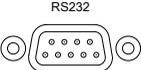
4.1.3 USB/RS-232C Remote Control Function Check

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

	Run this query command via the terminal after the instrument has been configured for USB or RS-232C remote control (page 36, 36).
	 *idn?
	 This should return the Model number, Serial number, and Firmware version in the following format:
	 STW-9701, XXXXXXXXXXXX, V1.00,
	     Model number : STW-9701
	     Serial number :12 character serial number
	     Firmware version : V1.00
	 CTRL+j can be used as the terminal character when entering the queries/commands from a terminal application.

Display	When the panel is being remotely controlled via the USB or RS-232C interfaces, RMT will be displayed on the screen.

```
MANU=001        NAME  001        REF#=0.000mA
HI=0.900mA       LO=0.000mA
              kV            mA      RMT   RDY
                                   TIMER=001.0S
 ACW                  2.5KV  ⏚
```
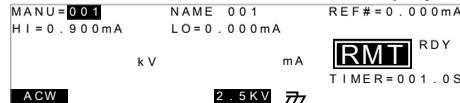
4.1.4 Return to Panel Control

Background	When the instrument is remotely controlled all panel keys except the STOP button are disabled.
Steps	3. When RMT is on the display, press the STOP button. The panel goes to the READY status.
⚠ Note	To put the tester back to RMT, simply issue another remote control command.
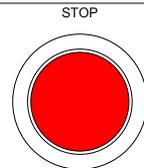
4.2 Command Syntax

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.

<div align="center">

MANU   MANU:ACW:VOLTage

|

ACW

VOLTage   CHISet   CLOSet

</div>
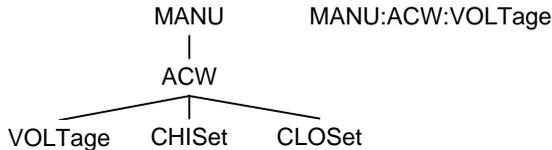
Command types	There are a number of different instrument commands and queries. A command sends instructions or data to the unit and a query receives data or status information from the unit. Command types	
	Setting	A single or compound command with/without a parameter
	Example	MANU:STEP 1
	Query	A query 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

4.3 System Commands

4.3.1 SYSTem:LCD:CONTrast

Set →

→ Query

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

4.3.2 SYSTem:LCD:BRIGhtness

Set →

→ Query

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

4.3.3 SYSTem:BUZZer:PSOUND

Set →

→ Query

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

4.3.4 SYSTem:BUZZer:FSOUND

Set →

→ Query

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

4.3.5 SYSTem:BUZZer:PTIMe

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

4.3.6 SYSTem:BUZZer:FTIMe

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

4.3.7 SYSTem:ERRor

Description	Returns any errors in the output buffer. See the error code table below for details.	
Query Syntax	SYSTem:ERRor ?	
Return parameter	<string>	Returns an error string that includes an error code and an error description.
	0,No Error	31,Current Setting Error
	20,Command Error	32,Current HI SET Error
	21,Volume Error	33,Current LOW SET Error
	22,String Error	36,REF Setting Error
	23,Query Error	38,ARC Setting Error
	24,Mode Error	40,TEST Time Setting Error
	30,Voltage Setting Error	
Example	SYST:ERR ?	
	>0,No Error	
	Returns "0,No Error" as the error message.	

4.4   Function Commands

4.4.1   FUNCtion:TEST

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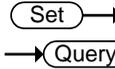
Description	Turns the currently selected test (output) on or off. Setting the FUNCtion:TEST command to OFF at the end of a test will also temporarily turn the PASS/FAIL buzzer sound off.	
Syntax	FUNCtion:TEST {ON|OFF}	
Query Syntax	FUNCtion:TEST?	
Parameter	ON	Turns the test on.
	OFF	Turns the test off.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

4.4.2   MEASure<x>

→ Query

Description	Returns the test function, judgment/status, test voltage, test current, elapsed test time.	
Query Syntax	MEASure?	
Return parameter	<string>	Returns the test status of the test in the following format: test function, judgment or status, test voltage, test current, elapsed test time
	Function	ACW
	Judgment /Status	PASS, FAIL, TEST, READY, ERROR, ARC, STOP, LOCK
	Test voltage	voltage+unit
	Test current	current+unit
	Test time	T=time+S / ---.-S (timer OFF)
Example	MEAS? >ACW, PASS , 1.038kV ,0.093 mA ,T=005.0S Returns the test result of the current manual test.	

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4.5   Manual Commands

4.5.1   MANU:STEP

Set →
→ Query

Description	Sets the MANU test number.
Syntax	MANU:STEP <NR1>
Query Syntax	MANU:STEP?
Parameter/ Return parameter	<NR1> 1~100.
Example	MANU:STEP 100
	Sets the manual test number to 100.

4.5.2   MANU:NAME

Set →
→ Query

Description	Sets or returns the test name for the selected manual test. Note: The first 4 characters must be letters (A-Z), or a space character. The last 6 characters must be numbers (0-9) or a space character. For example: ABCD123456
Note	The letters must be capital letters, lower case letters are not supported.
Syntax	MANU:NAME <string>
Query Syntax	MANU:NAME?
Parameter/ Return parameter	<string> 10 character string.
Example	MANU:NAME TEST1
	Sets the manual test name to "TEST1".

4.5.3   MANU:ACW:VRANge

Set →
→ Query

Description	Sets or returns the ACW voltage range.
Syntax	MANU:ACW:VRANge <NR1>
Query Syntax	MANU:ACW:VRANge?
Parameter/ Return parameter	<NR1> 0=2.5kV, 1=5kV
Example	MANU:ACW:VRAN 1
	Sets the voltage range to 5kV.

4.5.4 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 ~ 110.0
Example	MANU:ACW:CHIS 10.0 Sets the ACW HI SET current to 10 mA.

4.5.5 MANU:ACW:CLOSet

Set →

→ Query

Description	Sets or returns the LO current value in milliamps. The LO current value must be less than the HI SET value.
Syntax	MANU:ACW:CLOSet<NR2>
Query Syntax	MANU:ACW:CLOSet?
Parameter/ Return parameter	<NR2> 0.000 ~ 109.9
Example	MANU:ACW:CLOS 20.0 Sets the ACW LO SET current to 20 mA.

4.5.6 MANU:ACW:TTIMe

Set →

→ Query

Description	Sets or returns the test time setting in seconds or the elapsed test time when the test is running.	
Syntax	MANU:ACW:TTIMe {<NR2>|OFF}	
Query Syntax	MANU:ACW:TTIMe?	
Parameter	<NR2>	0.5 ~ 999.9 seconds
	OFF	TIMER OFF (special MANU mode).
Return parameter	<NR2>	0.5 ~ 999.9 seconds
	TIME OFF	TIMER is OFF (special MANU mode).
Example	MANU:ACW:TTIM 1 Sets the ACW test time to 1 second.	

4.5.7 MANU:ACW:REF

Set ⟶

⟶ Query

Description	Sets or returns the ACW reference value in mA. The ACW reference value must be less than the HI SET value.
Syntax	MANU:ACW:REF <NR2>
Query Syntax	MANU:ACW:REF?
Parameter/ Return parameter	<NR2> 0.000 ~ 109.9
Example	MANU:ACW:REF 0.01 Sets the ACW reference to 0.01 mA.

4.5.8 MANU:ACW:ARCCurrent

Set ⟶

⟶ Query

Description	Sets or returns the ARC current value in mA. ARC must be enabled before the ARC current can be set.

The ARC current range depends on the HI current value.

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

Syntax	MANU:ACW:ARCCurrent <NR2>
Query Syntax	MANU:ACW:ARCCurrent?
Parameter/ Return parameter	<NR2> 2.000 ~ 200.0
Example	MANU:ACW:ARCC 0.04 Sets the ACW ARC value to 0.04 mA.

4.5.9 MANU:UTILity:ARCMode

Set ⟶

⟶ Query

Description	Sets or returns the ARC mode status for the current test.
Syntax	MANU:UTILity:ARCMode {OFF|ON_CONT| ON_STOP}
Query Syntax	MANU:UTILity:ARCMode?
Parameter/ Return parameter	OFF Turns ARC mode off.
	ON_CONT Sets ARC mode to ON and CONTINUE.
	ON_STOP Sets ARC mode to ON and STOP.
Example	MANU:UTIL:ARCM OFF Turns ARC mode OFF.

4.5.10 MANU:UTILity:PASShold

Set →
→ Query

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

4.5.11 MANU:UTILity:MAXHold

Set →
→ Query

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

4.5.12 MANU:UTILity:GROUNDMODE

Set →
→ Query

Description	Sets or returns the Grounding mode of the current test.
Syntax	MANU:UTILity:GROUNDMODE {ON|OFF}
Query Syntax	MANU:UTILity:GROUNDMODE?
Parameter/ Return	OFF Turns ground mode off.
parameter	ON Turns ground mode on.
Example	MANU:UTIL:GROUNDMODE ON
	Turns GROUND MODE on.

4.5.13 MANU<x>:EDIT:SHOW

→ Query

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

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4.6 TEST OK Commands

4.6.1 TESTok:RETurn

Set ⟶
⟶ Query

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

Parameter/ Return parameter	ON	Enables the "OK" message to be displayed.
	OFF	Disables the message
Example	TEST:RET OFF	
	Disables the message.	

4.7 Common Commands

4.7.1 *CLS

Set ⟶

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

4.7.2 *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:
		STW-9701, XXXXXXXXXXXX, V1.00,
		Model number : STW-9701
		Serial number :12 character serial number
		Firmware version : V1.00

4.8   REMOTE Commands

4.8.1   *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

4.9   Error Messages

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

Error	Error Code
No Error	0
Command Error	20
Value Error	21
String Error	22
Query Error	23
Mode Error	24
Current Setting Error	31
Current HI SET Error	32
Current LOW SET Error	33
REF Setting Error	36
ARC Setting Error	38
TEST Time Setting Error	40

5. FAQ

● The tester will not turn on.

Ensure the power cord is connected. Ensure the line input is set to the correct line voltage. Check to make sure the fuse is not blown. See page 50.

● The panel keys are not working.

Ensure the tester is not in remote mode, page 37.

Ensure the tester is not in SIGNAL I/O or Remote Connect mode, page 30.

● 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 23.

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 can be started. See page34 for details.

Lastly, ensure that the Start Ctrl setting is correctly configured in the Common Utility menu. For example, to enable the START button to start a test, ensure that the Start Ctrl setting is set to FRONT PANEL. See page 30 for details.

● The accuracy does not match the specification.

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

For more information, contact your local dealer or TEXIO at www.texio.co.jp/ info@texio.co.jp

6. APPENDIX

6.1 Fuse Replacement

Steps

1. Turn the instrument off.

POWER

2. Remove the power cord.
3. Remove the fuse socket using a flat screwdriver.

4. Replace the fuse in the fuse holder.
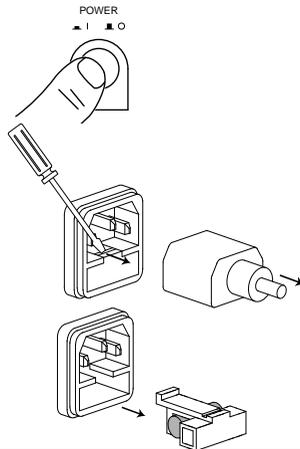
Fuse Rating: T7A 250V

6.2 Error Messages

6.2.1 Test Errors

The following error messages or messages may appear on the STW screen when configuring or running tests.

Error Messages	Description
SHORT	Voltage is too low or there is no High Voltage output. Indicates that the DUT could be shorted.
V ERR	Indicates that an abnormal voltage has been detected.

6.3   STW-9701 Specifications

The specifications apply when the STW-9701 is powered on for at least 30 minutes at 15˚C~35˚C.

6.3.1   Specifications

Environment

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

AC Test Voltage

Applied Voltage	0.1~2.5kV/0.1~5kV
Output Voltage	500VA (5kV,100mA)
Transformer Rating	500VA
Short-circuit current	200mA or more
Waveform	Ac line voltage waveform
Voltage Regulation	15%
(With nominal line voltage)	(Against change from maximum rated load to no load.)
Switching	With zero-turn-on (zero-start) switch

Digital Voltmeter

Full scale	2.5kV / 5kV fs
Accuracy	1% of reading + 10V 2.5kV fs
	1% of reading + 20V 5kV fs

Digital Ammeter

Accuracy	± (1.5% of rdg + 30 counts) when HI SET < 1.11mA
	± (1.5% of rdg + 3 counts) when HI SET ≥ 1.11mA
Current Measurement Range	0.001mA~100.0mA
Current Best Resolution	1uA
	0.001mA(0.001mA~1.100mA)
	0.01mA(01.11mA~11.00mA)
	0.1mA(011.1~100.0mA)

Pass/Fail Judgment

Type of judgment	Window comparator type
Upper cutoff current setting range	0.001 mA to 110.0mAAC
Lower cutoff current setting range	0.000 mA to 109.9mAAC
Judgment accuracy	±(3% + 40µA) of upper cutoff current
Current detection	The absolute value of current is integrated and compared with the preset cutoff current value

Calibration	Calibrated for rms value of sine wave, with pure-resistive load
Hi set valid judgment range	0.011mA to 1.100mAAC
	01.11mA to 11.00mAAC
	011.1mA to 110.0mAAC
Lo set valid judgment range	0.010mA to 1.099mA AC
	00.10mA to 10.99mA AC
	001.0mA to 109.9mA AC

Test Time

Setting range	OFF, 0.5s to 999s

Remote Control

REMOTE connector	(5-pin DIN connector on the front panel)
SIGNAL I/O connector	(9-pin D-sub female connector on the rear panel)
Interlock	ok
USB Device	ok
RS-232C	ok

General

DISPLAY	240 x 64 dot matrix LED back light LCD
MEMORY	100 memory blocks
POWER SOURCE	AC100V ±10% 50Hz/60Hz
POWER CONSUMPTION	Approx. 15VA (READY STATUS)
	Approx. 600VA (rated load)
ACCESSORIES	Power cord x1
	User Manual x1 (CD)
	GHT-114 x1
DIMENSIONS & WEIGHT	Approx. 322(W) x 148(H) x 385(D) mm (Max.)
	Approx. 16kg(Max)

Pay attention to the following limitations on the AC output voltage delivery time:
The heat dissipation of the high voltage generator section of the tester is one-half of the normal wattage with respect to the rated output due to limitations in the size, weight, and cost of the tester. Due to this, be sure to operate the tester within the limits shown in the table below. If you operate the tester and exceed these limits, the thermal fuse in the tester may blow out.

Ambient temperature t(ºC)	Upper current cutoff I(mA)	Pause period	Maximum allowable continuous test period
t ≤ 40ºC	50 < I ≤ 110	Not less than test period	≤ 30 min
	I ≤ 50	Not required	Continuous

Test voltage waveform:

When an AC test voltage is applied to a capacitive DUT, it is possible that the output voltage becomes higher than the originally set voltage if the voltage was set with the output open (no load connected).
Furthermore, waveform distortion also may occur if the capacitance of the DUT is voltage-dependent (such as of ceramics capacitors). When the test voltage is not higher than 1.5 kV and the capacitance is not larger than 1000 pF, such test voltage changes are only of negligible levels.

6.3.2   Dimensions

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