7631

Hi-pot tester

User Manual

V2.11

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Chapter 1 Safety Specification

This tester outputs voltage as high as 5kVac/6kVdc for external testing; accidents will happen if this tester is used incorrectly or improperly. Therefore, in consideration of your own safety, please read the precautions described in this chapter carefully and memorize them in order to prevent accidents from occurring.

1.1 Electrification and Electric Shock

In order to prevent electric shocks, the wearing of insulating plastic gloves is recommended before using this tester to perform testing related tasks.

1.2 Grounding

The back panel of the instrument is fitted with a safe ground terminal. Be sure to connect this ground terminal to the ground to prevent the operator from touching the housing as to cause the electrocution.

1.3 Power

Power that can be used with this machine is AC 100Vac~240Vac with a frequency range from 47Hz~63Hz; please confirm whether the input power voltage and frequency are within range before inserting the power.

1.4 Connect the testing cable to the high voltage output terminal

While the tester is powered off, insert the high voltage testing cables to the high voltage output terminals on the tester respectively, and confirm that the exteriors of the testing cables are not ruptured or shed.

1.5 Warm up

The tester can operate normally once the power is turned on; however, in order to achieve the accuracy within specification, please turn on the

machine in advance and let it warm up for 15 minutes or more before use.

1.6 External control host

This tester can perform external control; make sure the operator is not touching the high voltage output terminal and DUT when performing such controls in order to avoid causing danger.

1.7 Machine malfunction

If it is discovered that this tester has malfunctioned, for example: the voltage displayed on the voltmeter differs greatly from the voltage set, or there is no high voltage output but the high voltage output warning indicator remains on etc., cease usage immediately and contact our company or your dealer to perform repairs.

1.8 Test End

Turn off the power switch when the tester is not being used.

1.9 Placement and Storage

The normal temperature and humidity range of this machine is 5₀C – 40₀C, 80% RH; the actions might be abnormal if exceeding this range. The storage temperature and humidity range of this machine is -20₀C– 70₀C, 80% RH. In order to achieve accurate testing and for safety considerations, do not place this machine in environments with direct sunlight exposure, high temperature, high humidity, frequent vibrations or excessive dust.

1.10 Emergency Measures

When there is an electric shock or if the DUT or machine catches on fire, please switch off the power and unplug the power cable.

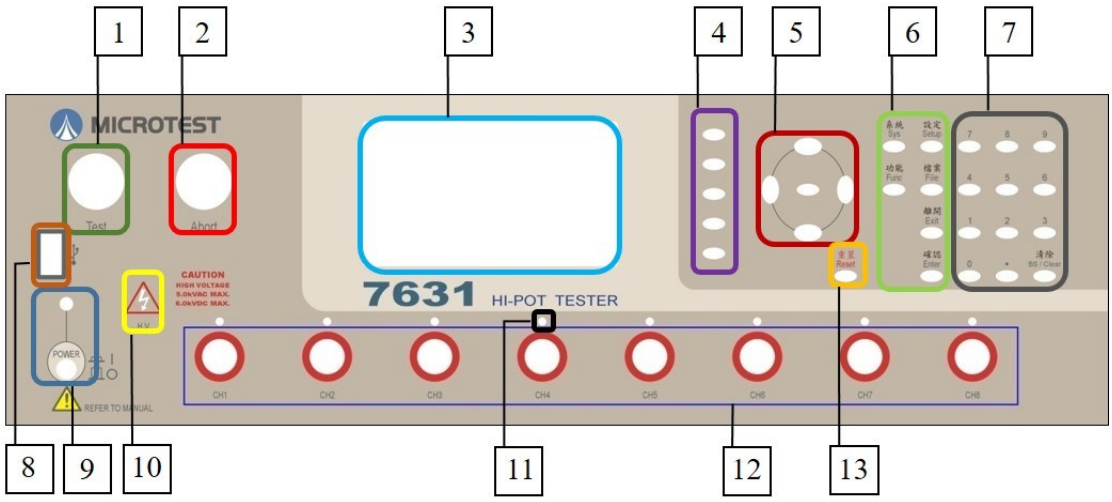
Chapter 2 General description

2.1 Package and Accessories

Standard accessories included with the HT-7631 high voltage tester package should include the following items:

1. HT-7631 high voltage tester *1
2. High voltage testing cable (red) *8
3. Power cable *1
4. User Manual Disc *1
5. Inter Lock short-circuit cable *1

2.2 Front Panel



(1) **Test key (with PASS light indicator)**: Press to start testing the system in READY mode, it lights up after being tested successfully.

(2) **Stop key (with FAIL light indicator):** Press to stop the test and close the high voltage output in test mode. It lights up when the test has failed. Press it to mute the alert buzzer.

(3) **LCD color display:** Display settings and test results

(4) **Software key:** These five software keys have functions as indicated by their screen, e.g. copy or delete. In case no functions are signed to a key, it displays a blank screen.

(5) **Arrow key:** These keys move the cursor for editing. The center key functions the same as the OK function key.

(6) **Function key:** Press to set up a function represented by the key which will be detailed later.

(7) **Numeric key:** Press to edit numeric data.

(8) **USB port:** Connect USB storage for setup file access and firmware updates. **Note: It supports FAT format only.**

(9) **Power switch: Power on or off the host.**

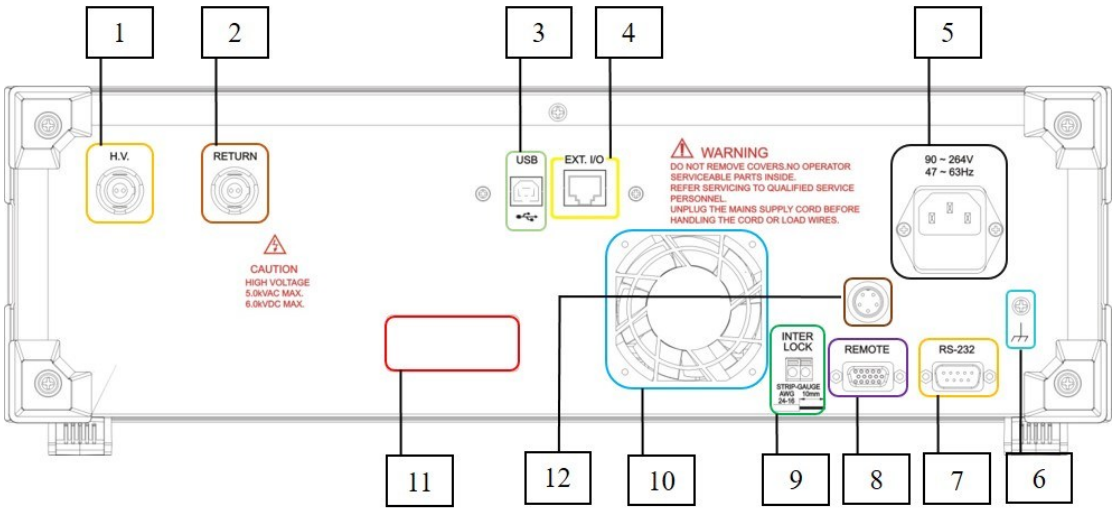
(10) **High voltage output light indicator:** It lights up when there is a current output. DO NOT touch the high voltage output port when this light is on as you may get shocked.

(11) **High voltage output status light indicator:** It lights up red when there is a high voltage current output at this port and is green when there is low voltage.

(12) **High voltage output port:** Port for current output test.

(13) **Reset key:** Press to reset the machine in case of an unexpected system error.

2.3 Rear panel



(1) High voltage output terminal: Connection to the expansion box

(2) Low voltage output terminal: Connection to the expansion box

(3) USB port: Connection to the computer for controlling the machine with computer instructions

(4) Expansion box port: Connect this port and an expansion box with a connection cable

(5) AC power socket: AC power input connector with a 250V/3.15A fuse

(6) **Iron casing terminal:** Ground your machine with this terminal for more steady device operation

(7) **RS-232 connector:** Connect to the computer to control your machine with computer instructions

(8) **Remote controller port:** Signal for external control including the determination and testing signal output or input of an external signal for test start and stop

(9) **Inter Lock port:** High voltage current output safety switch. Short circuit both ends of this port during testing for the test voltage output. Opening the circuit of this port during testing will stop the test and prompt the message “INTER LOCK”

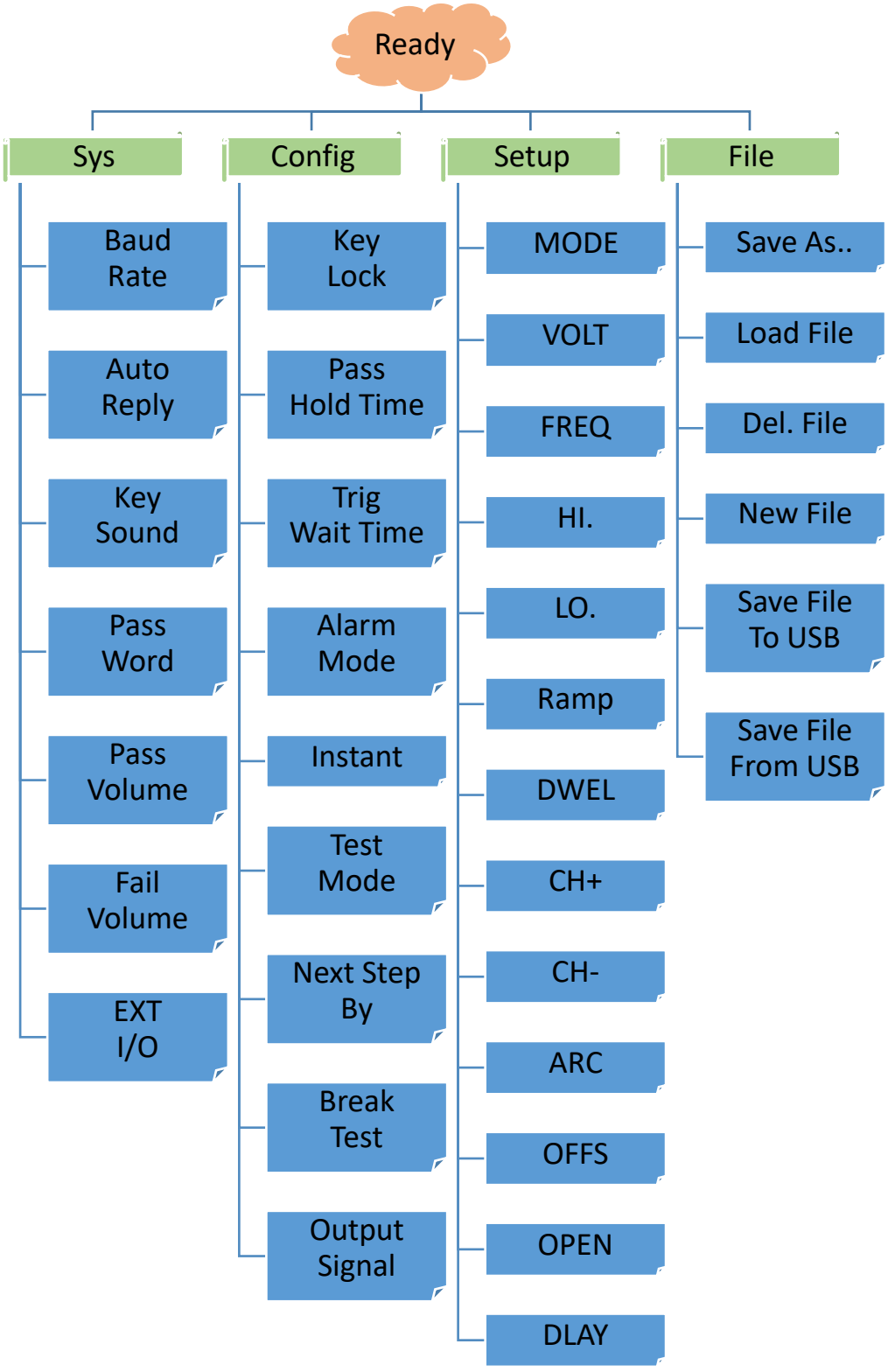
(10) **Exhaust outlet:** Air exhaust for cooling

(11) **Serial number sticker:** Indicates the serial number of your machine

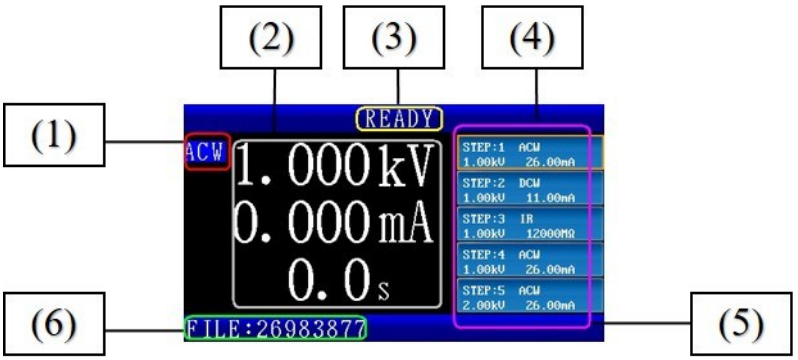
(12) **High voltage test rod port:** Connects to the high voltage test rod

Chapter 3 Basic operation description

3.1 Function block diagram



3.2 Standby screen description



(1) Display the current test mode: Message “ACW” for AC voltage testing, “DCW” for DC voltage testing, “IR” for insulation impedance testing

(2) Readings of the voltage, current (resistance in IR mode), and test time of the measurement output port now. It displays the current voltage and test time settings if no test is running now.

(3) Display the current status of your machine as illustrated in the table below:

Status display	Description
READY	Your machine is ready for testing now, press the TEST key to begin testing
TEST	Testing now
WAIT	The Trig Wait Time which can be set up in the CONFIG menu
WAIT KEY	Waiting for the trigger signal for the next test
PASS	Tested successfully (qualified goods)
Break Down	Leak current exceeds the maximum measurement
Arcing	Arc exceeds the upper limit
Lo-Limit	Measurement exceeds the lower limit
Hi-limit	Measurement exceeds the upper limit
FAIL	At least one step in a multi-step test failed
INTER-LOCK	High voltage safety lock on
VOLT-ERROR	Voltage output error

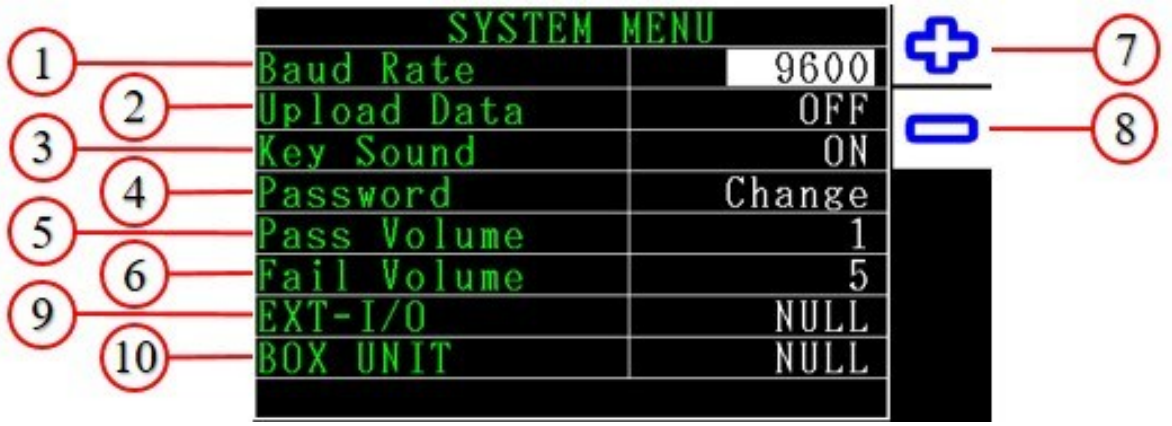
OPEN	Test wire disconnection error

(4) Display the first five test steps of the current file

(5) The orange color framed step is the one under testing (DUT) now along with its specifications displayed. You may select the desired step by moving the cursor to it with arrow key. Press the ENTER key to set up the test items.

(6) Display the name of the current file. The name appended with an asterisk " * " suggests the file has been edited but not saved. In this case the current settings cannot be copied to a mobile storage device.

3.3 System settings description



(1) **Baud Rate:** You may set up a transmission speed of RS-232 to 9600, 19200, 38400, 57600, or 115200. Please note that this needs to be aligned with the speed at the control end.

(2) **Upload Data:** Upload test results automatically, select OFF, RS-232, FLASH, BOTH. When the function is set to RS-232, the machine will automatically reply to the current status. The status is: the machine will return the string of POWER ON when the machine is turned on, the machine will return the string of START when the test is started, and the machine will return the current test step and result when the test is over, for example, 01, ACW,1.001e +03,7.169e-06,PASS, there are five fields in the data, all separated by commas. The first field represents the step number of the test. The second column represents the test mode, there are seven types of ACW, DCW, IR, CONTACT, ACW-P, DCW-P, and IR-P. The third column represents the output voltage during the test, expressed in scientific notation. The fourth field represents the current value during the test, expressed in scientific notation (if the test item is IR,

this field returns the resistance value). The fifth column represents the result judgment: PASS (determined good product), HI-Limit (over the upper limit of the set value), Lo-LIMIT (below the lower limit of the set value), INTER-LOCK (high voltage safety lock start), ABORT (test suspension)), BREAKDOWN (Crash Point Detection), ARCING (Discharge Detection), VOLT ERR (Voltage Output Abnormal), OPEN (Destination Error), etc. If a multi-step test is performed, the final test will be added after the end of the test. critical result. When the function is set to FLASH, the test result will be automatically written into the mobile access device after the standby test is over, the format is the same as the RS-232 content; the data storage path is \7631\STAT\current test file name .csv. When the function is set to BOTH, the above two actions will be performed simultaneously. When the function is set to OFF, the function is turned off.

Note: When the RS-232 and FLASH functions are turned on, because it takes some time to transmit data (depending on the set transmission rate and mobile access device), it will cause some time delays for continuous or multi-step testing.

(3) Key Sound: Switch the key sound on/off (the keyboard clicks after a key is pressed successfully).

(4) Password: This is the password protecting the keyboard lock. When the latter is on you have to input the correct password to unlock the keyboard. You may change the password here. Its factory default value is 7631.

(5) Pass Volume: Volume for qualified goods after testing. You can set the volume in 5 steps from 1 to 5 with 1 being the softest and 5 the loudest. You can mute the pass sound in the CONFIG page.

(6) Fail Volume: Volume for failed goods after testing. You can set the volume in 5 steps from 1 to 5 with 1 being the softest and 5 the loudest. You can mute the fail sound in the CONFIG page.

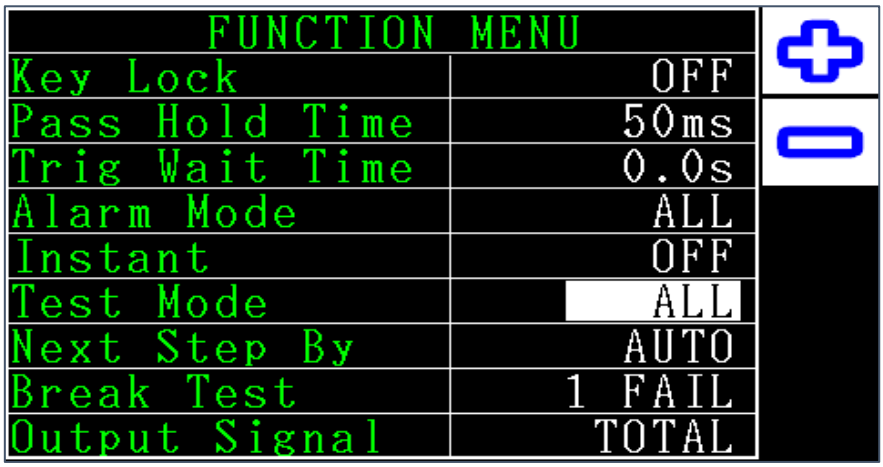
(7) Adjust upward: You may press the corresponding software key when this symbol is displayed to tune options upward or increase the numeric value by 1 after each key is pressed.

(8) Adjust downward: You may press the corresponding software key when this symbol is displayed to tune options downward or decrease the numeric value by 1 after each key is pressed.

(9) EXT-I/O: External expansion I/O board, if the field shows NULL, it means that no expansion I/O board is currently connected, if it shows EXIST, there is an expansion I/O board connected.

(10) BOX UNIT: The number of scanner box, if the field shows NULL, it means that no scanner box is currently connected, if it shows 1~ 4, there is 1~ 4 scanner boxes connected.

3.4 Function setup description (FUNC)



(1) **Key Lock:** Keyboard lock prevents the test conditions from changes by unexpected user operation. Once it is on, users can start and stop the test without changing any settings. To unlock the keyboard, input the password you set earlier. To change the password, please refer to the system setup steps given earlier.

(2) **Pass Hold Time:** The Retaining time for the qualified goods message display. Your machine prompts the message “PASS” and the output signal at the remote control port once a product is tested as qualified. This function sets up a time span of message display and signal output with the options of 50mS, 100mS, 500mS, 1S, 2S, 5S and Infinity. The “Infinity” option keeps on displaying test results until the ABORT key is pressed.

(3) **Trig Wait Time:** This is the time span after your machine enters the test page (the “WAIT” message prompts in the status column) by pressing the test key until there is a high voltage current output for the test. This is used to get the test jig triggered and positioned for testing.

(4) **Alarm Mode:** The alert mode has the options of ALL (alert all), PASS (alert for qualified goods), FAIL (alert for failed goods), and OFF.

(5) **Instant:** You have to press and hold the TEST key to run the test in this mode. Release the key and the test stops immediately.

(6) **Test Mode:** You may run the test in a single- or multi-step mode. You may press the up and down arrow key in single-step mode to select the desired test step and get test results immediately. Your machine begins test with the first step in SETUP through to the last one in multi-step mode. Test results are determined by the subsequent settings.

(7) **Next Step By:** In multi-step mode your machine runs the next step based on the given trigger source after the first one has ended. With the option “AUTO”, the test runs the next step automatically; “Trig”, the next step, will run only after the TEST key is pressed. This item is available only when **Test Mode is set to the option ALL.**

(8) **Break Test:** In multi-step mode, your machine stops or continues the test based on the settings in this field in case the results are failed goods. With option “1 FAIL”, the test stops immediately in case of failed goods; for “OFF”, the test ends only after the last step is executed. This item is available only when **Test Mode is set to the option ALL.**

(9) **Output Signal:** In multi-step mode, your machine gives a results signal in case this is set to the option “EACH”; with the option “TOTAL” it gives the output signal “PASS” or “FAIL” only after the test has ended.

3.5 Specification setup description (1)

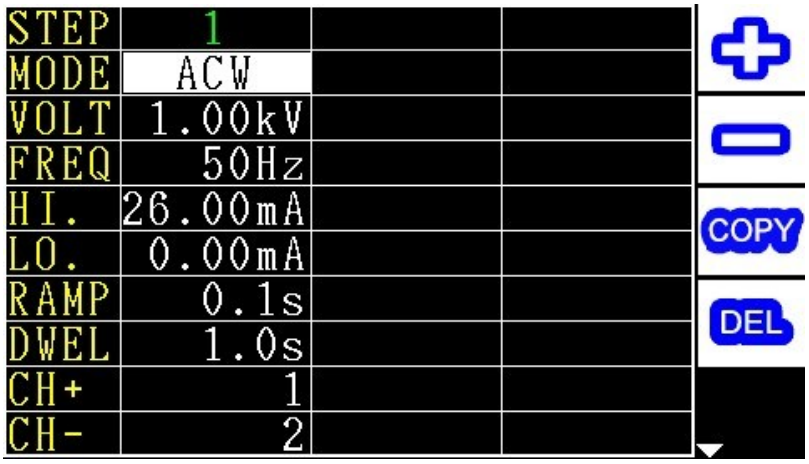


Figure 3-5-1 Setup 1

(1) **STEP:** Step ID. Each file can have up to 32 steps. Press the software key COPY to add the next step; press the software key DEL to delete the step where the cursor is positioned. Each file must have at least one step.

(2) **MODE:** There are seven test mode options: ACW, DCW, IR, Contact, ACW-P, DCW-P, IR-P which you can select with a software key.

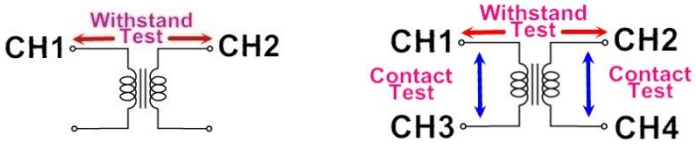
1. **ACW:** Use AC voltage to measure the current value on the DUT.

2. **DCW:** Use DC voltage to measure the current value on the DUT.

3. **IR:** Use DC voltage to test and measure the Insulation value on the DUT.

4. **Contact:** Use AC voltage (Approximately 10V) to measure whether there is resistance under 100kΩ between channels. If it is, the result will show Pass, otherwise, it will show Fail. Generally used for multi-step testing, first use this function to check whether the wiring is correct. It is to ensure that the test wiring is correctly connected to the DUT before the voltage withstands test.

For example:



General test　　Contact check before test

(Set Step 1 to be contact mode, and test CH 1-3
Set Step 2 to be contact mode, and test CH 2-4
Set Step 3 to be ACW mode, and test CH 1-2)

5. **ACW-P, DCW-P, IR-P:** These test modes are the same as the general ACW, DCW, and IR test methods. The difference is that after setting the Parallel mode, if the test result of this step is PASS, the machine will look for the next step with the mode set to Parallel for testing. If the test result of this step is FAIL, the machine will proceed to the next step for testing. This mode is generally used for parallel testing of multi-DUT.

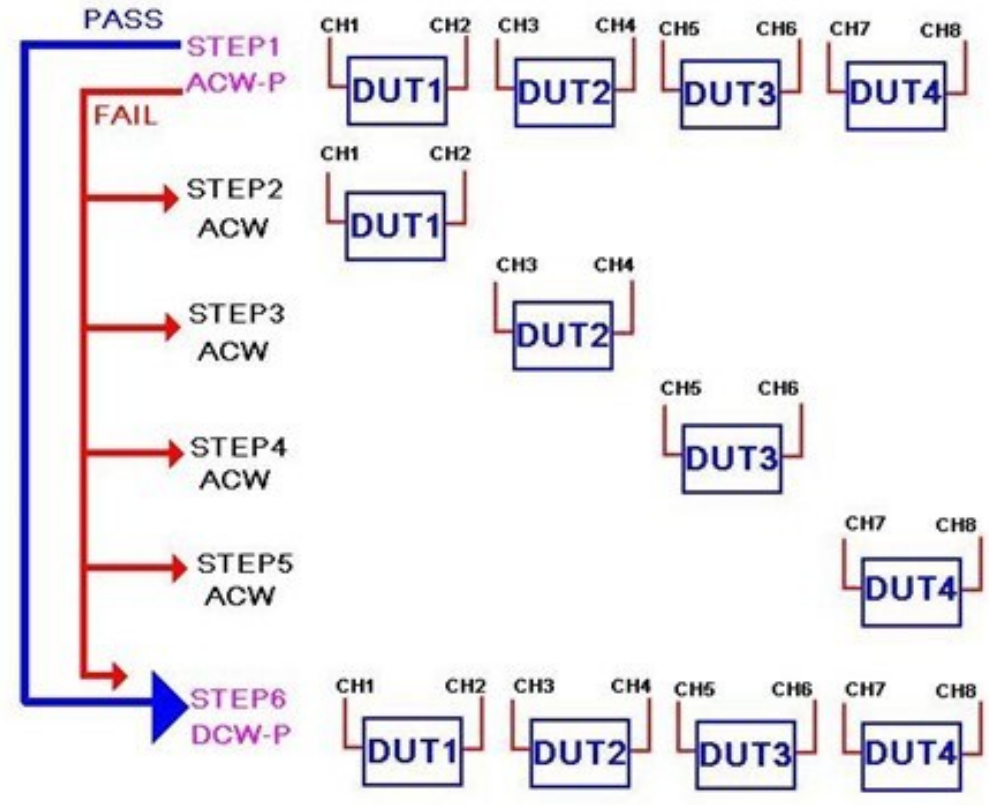


Figure 3-5-2 Parallel test

The figure 3-5-2 is the test flow chart of Parallel mode. As shown in the figure, STEP-1 and STEP-6 are setting Parallel mode. If STEP-1 judges FAIL during the test, the machine will test according to the items set in STEP-2, 3, 4, and 5 to analyze which DUT is defective. If the STEP-1 test result is PASS, the machine will directly skip STEP-2, 3, 4, and 5 steps, and directly test the next step (STEP6) set to Parallel for testing to save test time.

(3) **VOLT:** Set up the test voltage by typing its value with a numeric key. The maximum voltage varies with the test mode for ACW: 5.0kV, DCW: 6kV, IR: 1kV. Their minimum values are all 0.1kV.

(4) **FREQ:** You may opt for a test frequency of 50Hz or 60Hz.

(5) **HI.:** This is the upper limit of measurement. In case test readings exceed this limit the test has failed and is ended immediately. This value varies with the test mode for ACW: 26mA, DCW: 11mA, IR: 1200MΩ. For IR tests with settings at 1200M, no upper limit will be judged.

(6) **LO.:** This is the lower limit of measurement. In case test readings exceed this limit, the test has failed and is ended immediately. For settings at a value 0, no lower limit will be judged.

(7) **Ramp:** This is the time span for the voltage to rise from 0 to the target value ranging from 10S to 0.1S.

(8) **DWEL:** This is the time span for sustaining the test after the voltage reaches the given settings. For a setting of value 0, the test continues until the stop key is pressed or the test fails.

(9) **CH+, CH-:** This item sets up the high or low voltage output channel. There are 8 options for you to set as desired. Check the channel number in the CH+ row to set it as the high voltage channel and in the CH- row to set it as the low voltage channel; numbers not checked represent closed channels. See below for the setup page.

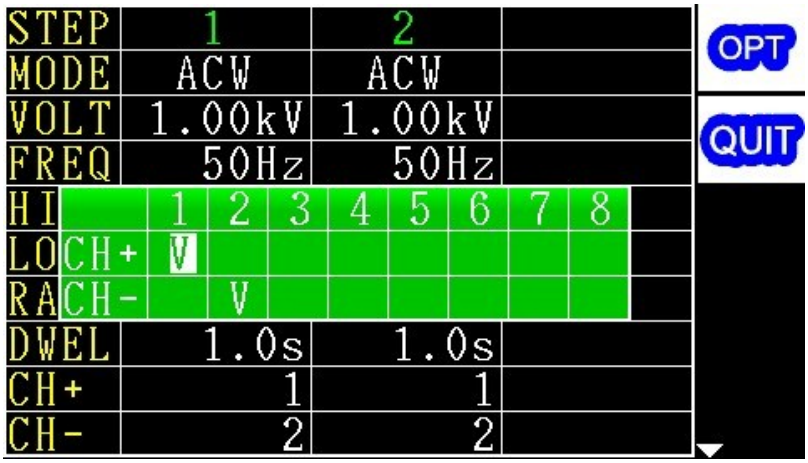


Figure 3-5-3 Channels

3.6 Specification setup description (2)

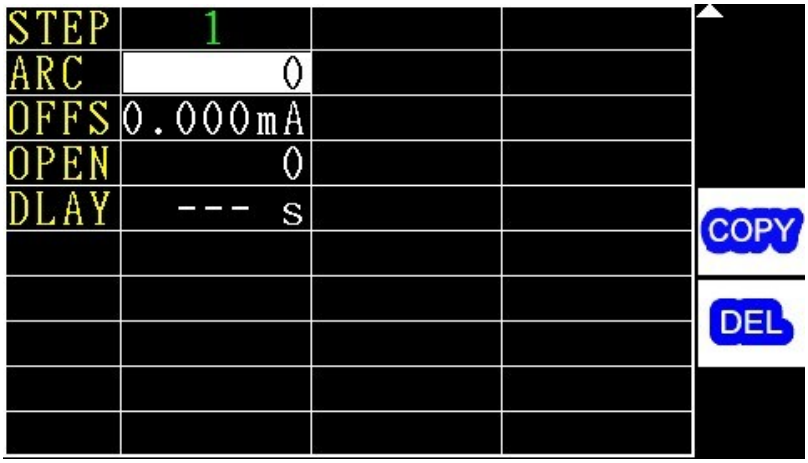


Figure 3-6-1 Setup 2

(1) **ARC:** This item sets up arc sensitivity. The greater the value is, the less sensitive the arc detection is. Setting it to 0 will disable your machine from making any judgment over the arc during the test.

(2) **OFFS:** This item resets the test end to prevent the impact of the external jig on accuracy. It deducts the leak current by the jig in advance and displays the actual leak current of the DUT with the

equation “measurement readings = actual measurement less reset value”. This item has two options: Manual and auto. The first requires manual input of the leak current value. The second contains the following steps: Remove the DUT from your machine; point the cursor to the field OFFS and press the software key AUTO; your machine measures according to the given voltage statistics and prompts the results; the message “SAVE=ENTER” displays after the measurement operation is done; press the ENTER key to save the test value or the EXIT key to exit without saving it; the saved value will be deducted from each measurement to enable a more accurate test.

(3) **OPEN:** Open circuit detection sensitivity. Poor connection of the high voltage test wire to the DUT may lead to a lower measurement current and invalid qualified product results in the voltage test. Once this function is enabled (with non-zero settings) your machine will measure the DUT's capacitance with low voltage for about 200ms before the high voltage test begins. In case the measured capacitance value is lower than the settings, the test wire may not be connected to the DUT properly and your machine will stop the test and prompt the message “OPEN”. You may set this in two options: Manual and auto. The first requires manual input of the given value. The second contains the following steps: Connect the DUT properly; point the cursor to the field OPEN and press the software key AUTO; your machine measures the given output channel and prompts the results; the message “SAVE=ENTER” displays after the measurement operation is done; press the ENTER key to save the test value or the EXIT key to exit without saving it.

Note: In case readings with or without connection to the DUT differ from each other in a range less than 20, then its capacitance is too small and may not be valid for using this method for an open circuit test.

(4) **DLAY: This item is aimed at judging the delay time and is editable only in IR mode.** For IR tests of the DUT with capacitance, this can be judged only after the capacitor is fully charged. The delay time starts counting only after voltage has reached the settings. Before that, your machine displays measurement without the upper

and lower limit determination and enters judgment mode immediately after the delay time has expired. **As the delay time is contained in the test time, its settings must be lower than the latter.**

(5) **High voltage output time and results determination timing:** See the diagrams below for the results determination the timing after the TEST key is pressed by the user. Please note that in the IR delay and ascending time, no upper and lower limit will be determined while only the upper limit will be determined in the ascending time of the ACW and DCW modes.

	Mode	Low Limit Judgment	Hi Limit Judgment
Ramp Time	ACW	Disable	Enable
	DCW	Disable	Enable=Ramp Time > Delay Time
	IR	Disable	Disable
Dwell Time	ACW	Enable	Enable
	DCW	Enable=(Ramp Time + Dwell Time)>Delay Time	Enable=(Ramp Time + Dwell Time) > Delay Time
	IR	Enable=(Ramp Time + Dwell Time)>Delay Time	Enable=(Ramp Time + Dwell Time) > Delay Time

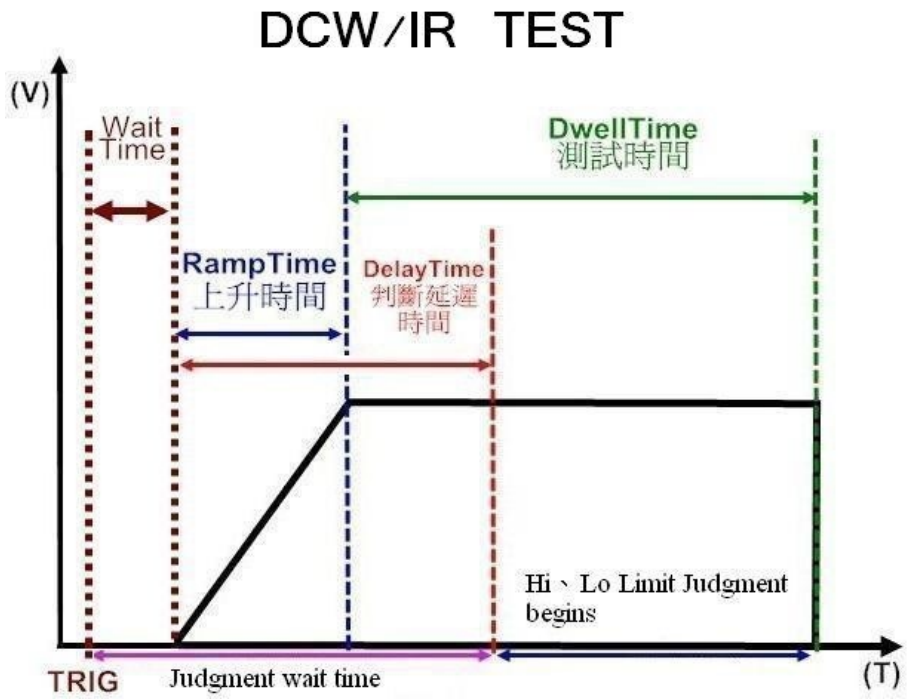


Figure 3-6-2 DCW/IR-TEST

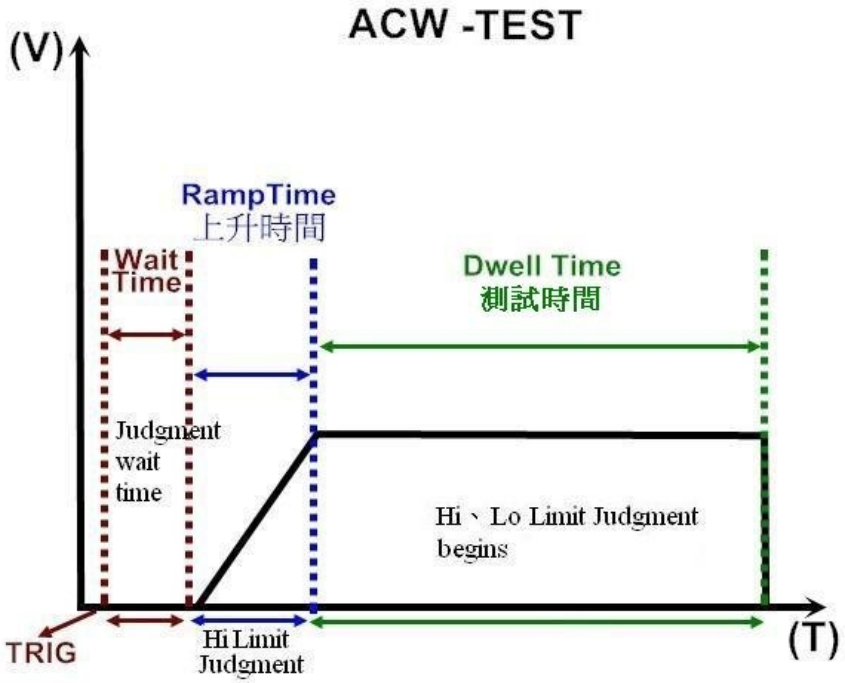


Figure 3-6-3 ACW-TEST

3.7 File management (FILE)

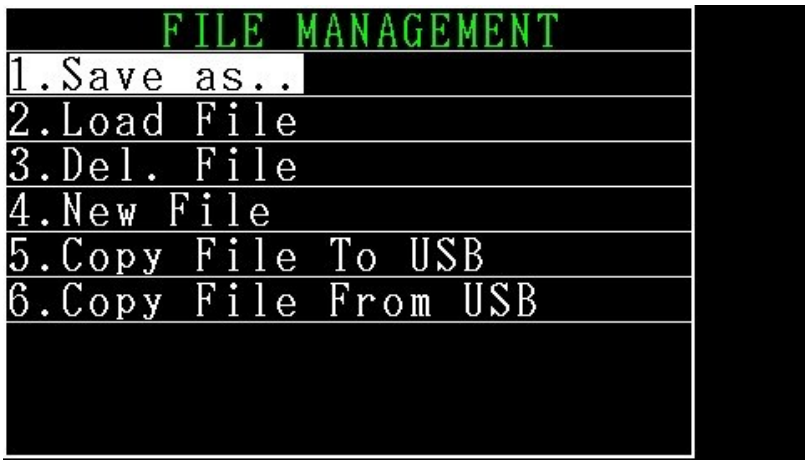


Figure 3-7-1 File

(1) **Save As..:** This option saves the setup file with a new file name **(there can be up to 15 files saved in your machine).** The “file save” page displays the existing files in your machine. In case a USB drive is connected, a USB icon shows in the upper right corner of the page. You may press the software key to select saving a file in the USB drive or internal memory. You can type a new file name or select an existing file with the arrow key as shown in the figure 3-7-2 below.



Figure 3-7-2 Save File Name

(2) **Load File:** This item reads the existing file. The “file access” page displays the existing files in your machine. In case a USB drive is connected, a USB icon shows in the upper right corner of the page. You may press the software key to select retrieving a file in the USB drive or internal memory. You can type the file name or select the existing file with the arrow key as shown in the diagram below. **Please note that all setting files are auto generated by your machine. DO NOT edit this data as the file may be damaged or the machine may run improperly.**



Figure 3-7-3 Load File

(3) **Del File:** This item deletes the file in a manner similar to saving or retrieving it.

(4) **New File:** This item initializes all existing files and creates a new one.

(5) **Copy File to USB:** This item copies the existing setup files to a USB drive and overwrites any one in the latter with the same name. Enter this page to display the files existing in your machine, press the

software key OPT to select one or more desired files, press the software key COPY to start copying the selected files. You may press the software key ALL to select all files shown in the current page for copying. Please note that the ALL option is valid for files on the current page only. For files on the next page, do the same to copy them as shown in the diagram below.

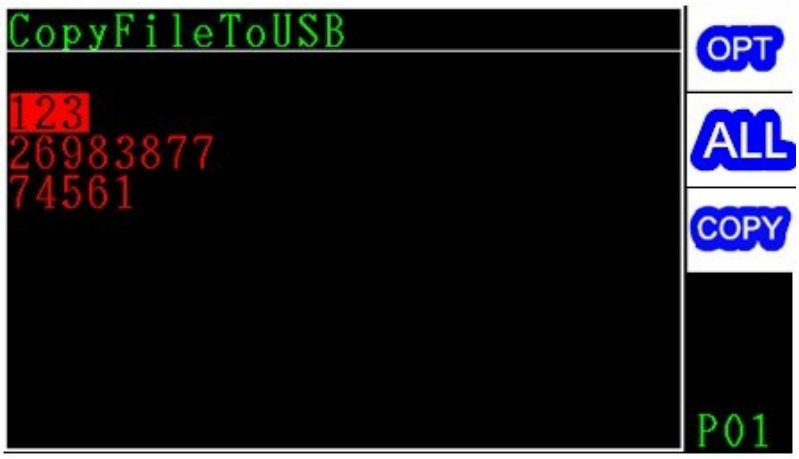


Figure 3-7-4 Copy File To USB

(6) **Copy File from USB:** This item copies the existing setup files to your machine from the USB drive and overwrites any one in the former with the same name. Enter this page to display the files existing in USB drive, press the software key OPT to select one or more desired files, press the software key COPY to start copying selected files. You may press the software key ALL to select all files shown in the current page for copying. Please note that the ALL option is valid for files on the current page only. For files on next page, do the same to copy them as shown in the diagram below.



Figure 3-7-5 Copy File From USB

Chapter 4 Start testing

4.1 Before testing

(1) Validate specification setup.
(2) Validate the proper connection between your machine and DUT.
(3) Validate that the message READY is prompted. (Figure 4-1-1)
(4) Press the TEST key to start testing. (Figure 4-1-2)



Figure 4-1-1 Ready

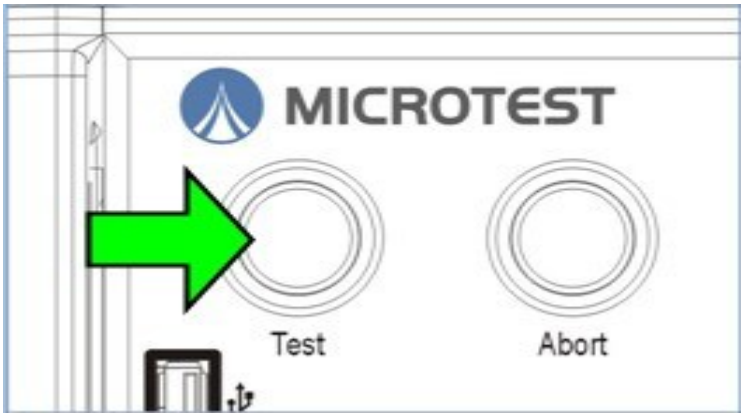


Figure 4-1-2 Test button

4.2 Testing in progress

(1) The message TEST is shown in the message column. (Figure 4-2-1)
(2) The high voltage output light indicator is ON in the front panel. (Figure 4-2-2)
(3) Measure the output voltage and leak current.

(4) Test time counting. For tests lasting longer than 100 seconds, their integral portion is displayed while the decimal portion is hidden; if it is longer than 999 seconds then it stops counting the time while the number 999 remains flashing on screen.

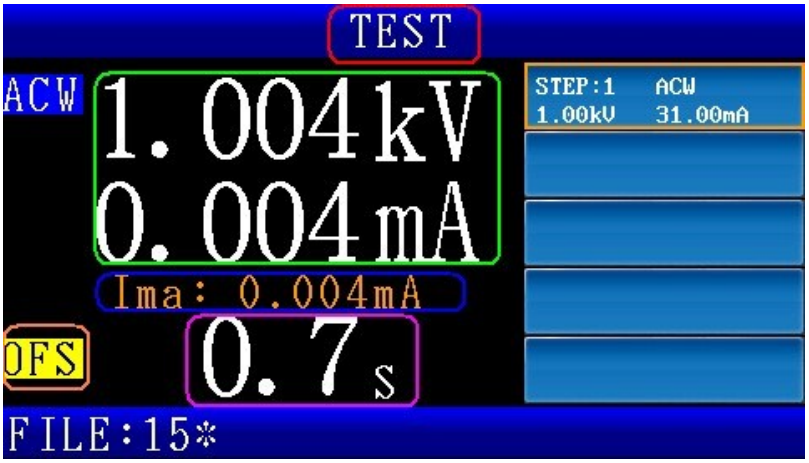


Figure 4-2-1 Test

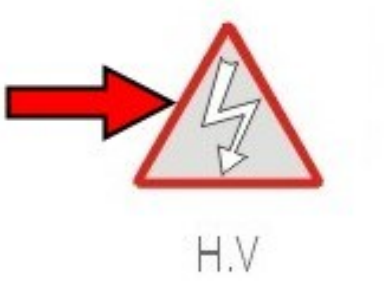


Figure 4-2-2 H.V LED

4.3 Ending a Test

(1) Press the ABORT key to stop testing.

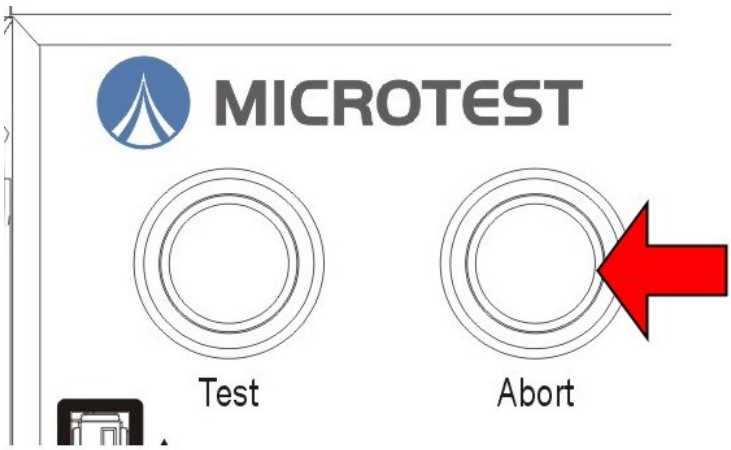


Figure 4-3-1 Abort

(2) Current/resistance measurements over the upper limit (HI-LIMIT).

(3) Current/resistance measurements below the lower limit (LO-LIMIT).

(4) Leak current over the maximum measurement (Break Down).

(5) Arc is over the settings (Arcing).

(6) Output safety switch is enabled (Inter Lock).

(7) The terminal to be tested is open (OPEN).

(8) Test time expired.

The test ends in case of any of the above. The high voltage output light indicator turns off and the high voltage output closes after the test has ended. Tests ended because of the conditions 2-8 described earlier will prompt determination results.



Figure 4-3-2 Pass

4.4 Release determination results

(1) After the test time has expired, the PASS light indicator turns on and the message “PASS” prompts. After the PASS HOLD time has expired, the page refreshes to READY status and the PASS light indicator turns off. In case PASS HOLD is set to Infinity, then you have to press the ABORT key to release the determination results display.

(2) In case the test fails then a red FAIL light indicator turns on and the message “FAIL” prompts. You have to press the ABORT key to release the determination results display.



Figure 4-4-1 Fail

Chapter 5 Remote control I/O description (Remote)

The back panel of your machine comes with a remote control connector (REMOTE). Please connect the control wire to it to enable controlling your machine with an external signal. In cases like this, the test operator will not touch the high voltage output end to prevent personal injury.

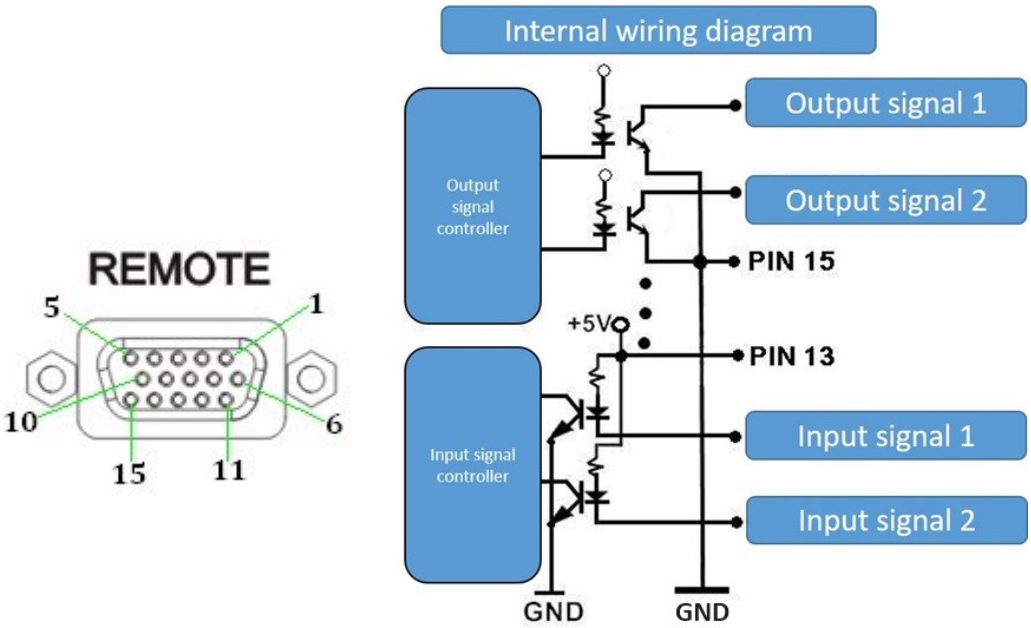


Figure 5-1 Remote

Pin	Name	I/0	Function
1	CTL1	O	Reserved
2	CTL2	O	Reserved
3	CTL3	O	Reserved
4	CTL4	O	Reserved
5	TESTING	O	Test in progress
6	PASS	O	Determination PASS
7	FAIL	O	Determination FAIL
8	HV-ON	O	High voltage output in progress
9	GND	---	Earthing point of your machine
10	TRIG	I	Test trigger
11	ABORT	I	Test abortion
12			
13	+5V	---	DC +5V output
14	+12V	---	DC +12Voutput
15	GND	---	Earthing point of your machine

Use description:

PIN1-PIN8 is a collector open output without any voltage or signal. Current passing through the connector must be less than 50mA.

(1) **TRIG (Pin10)**: Functions the same as the TEST key in the front panel when short circuited with Pin9、15 (GND).

(2) **ABORT (Pin11)**: Functions the same as the ABORT key in the front panel when short circuited with Pin9、15 (GND).

(3) **PASS (Pin6)**: Conduct with Pin9、15 (GND) when the DUT is determined to PASS by your machine.

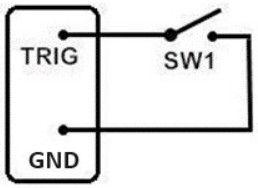
(4) **FAIL (Pin7)**: Conduct with Pin9、15 (GND) when the DUT is determined to FAIL by your machine.

(5) **TESTING (Pin5)**: Conduct with Pin9、15 (GND) when your machine is testing.

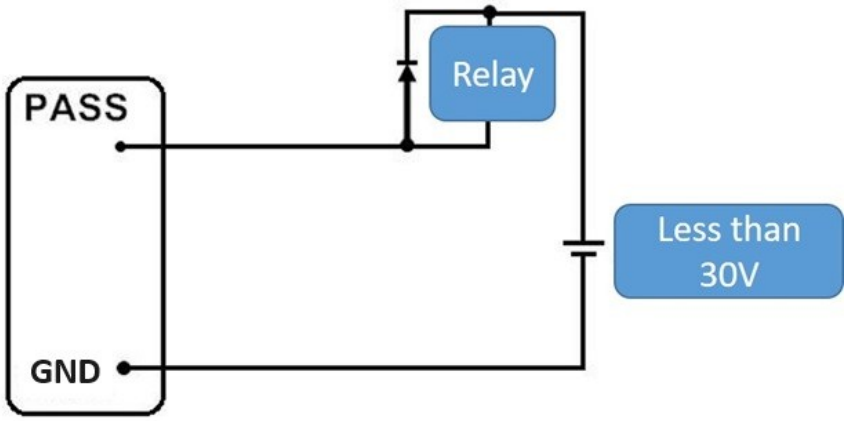
(6) **H.V. ON**: Conduct with Pin9、15 (GND) when your machine is outputting high voltage.

Frequent uses:

1. (Input signal) Control your machine for testing by using a normal open switch relay.



2. (Output signal) Control the relay with the output signal. Please connect the relay coil to a regulator diode for safer application



Chapter 6 RS-232/USB drive use description

6.1 RS- 232 interface specification

Baud Rate: Available options are 9600/19200/38400/57600/115200 and it can be set up in the System mode

Transmission bits: 1 initial bit, 8 data bits, 1 ending bit

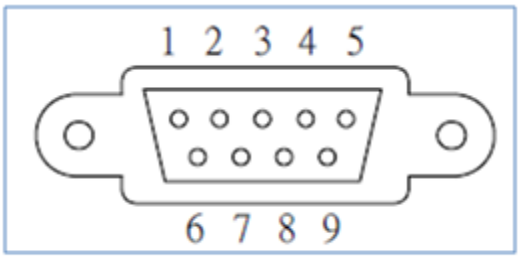
6.2 Command format

The RS-232 interface function of your machine is exercised by a command string in ASCII code for remote control and setup. Each command string is composed of the command code and its parameters, two commands are connected with a semicolon ";", and appended with an end code. There are two types of end code: LF(0x0a) and CR(0x0d)+LF(0x0a).

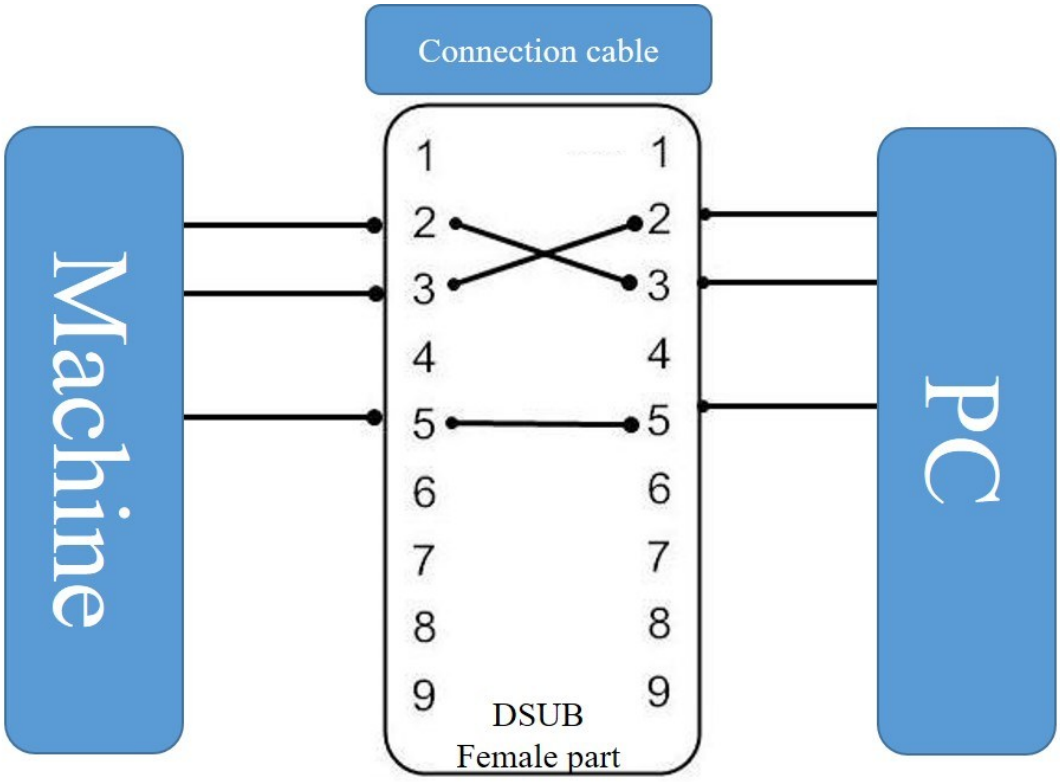
6.3 Connector

Your machine employs a 9-pin male connector with pin functions outlined in the table below:

Pin	Name	Description
1	CD	Reserved
2	RxD	Transmit data
3	TxD	Receive data
4	DTR	Reserved
5	GND	Signal earthing point
6	DSR	Reserved
7	RTD	Reserved
8	CTS	Reserved
9	RI	Reserved



6.4 Connection cable and method



6.5 USB device interface specification

Interface I/O	USB Specification 2.0 Self-powered Transfer rate: MAX 12Mbps(Full Speed)
Command string end code	For receiving: LF or EOM For transmission: LF+EOM
Vendor ID	0x1FC9
Product ID	0x811D

Chapter 7 Remote command

7.1 Instruction summary

Common instruction
*CLS
*IDN?
*OPC
*OPC?
*OPT?
*RCL
*SAV

SCPI command

:CONFigure	:KLOCk	<ON , OFF, 1, 0>		
	:ALARm	<ALL,PASS, FAIL,OFF>		
	:PHOLd	<50ms,100ms,500ms,1s,2s,5s,INFinity>		
	:TGWAit	<NRf>		
	:TMODe	<SINGLE,MULTI>		
	:TMODe	:MULTi	:TSOUrce	<AUTO,TRIG>
	:TMODe	:MULTi	:BREAk	<FAIL,OFF>
	:TMODe	:MULTi	:SIGNal	<EACH,TOTAL>
:EDIT	:STEP	<numeric>		
	:FUNCtion	<ACW,DCW,IR>		
	:VOLTage	<NRf>		
	:FREQuency	<NRf>		
	:HILImit	<NRf>		
	:LOLImit	<NRf>		
	:RAMP	<NRf>		
	:DWELl	<NRf>		
	:CHANnel	:POSItive	<numeric>	
	:CHANnel	:NEGAtive	<numeric>	
	:CHANnel	:CLOSe	<numeric>	
	:ARC	<numeric>		

	:OFFSet	IMAG	<NRf>	
	:OFFSet	REAL	<NRf>	
	:OPEN	<NRf>		
	:IR	:DELAy	<NRf>	
	: STEP	: COUNt?		
	: STEP	: DELete	<numeric>	
	: STEP	: ADD	<numeric>	
	: STEP	: CONDition	<numeric>	
:MEASure	:VOLTage?			
	:CURREnt?			
	:RESistance?			
	:TIME?			
:OPERation	:STEP	<numeric>		
	:FILE?			
:RESU?				
:STAR				
:STOP				
:SYSTem	:AUREply	<ON , OFF, 1, 0>		
	:KYSOund	<ON , OFF, 1, 0>		
	:ALARm	[:VOLUme]	:PASS	<numeric>
	:ALARm	[:VOLUme]	:FAIL	<numeric>
	:ERROr?			
:TEST	:ABORt			
	:EXECute			

7.2 Command description

Shared command

Command	Function
*CLS	Erase data in every register
*IDN?	Read the basic device data including the manufacturer, model, serial number, firmware release and output in comma delimited format
*OPC	Operation completion command
*OPC?	Query operation completion command: Return value 1 if operation completed; otherwise return value 0
*OPT?	Query whether the device is optional
*RCL	Command for reading the machine's internal files with the parameter of the file name in ASCII code, e.g. command "*RLC 26983877" means reading the file with the name "26983877"
*SAV	Command for saving the current settings in a new file with the file name in ASCII code, e.g. command "*SAV 26984089" means saving current settings in file with name "26984089"

SCPI command

:CONFigure:KLOCk <ON , OFF, 1, 0> This command locks or unlocks the keyboard Example: CONF: KLOC ON Example description: Locks the keyboard Example: CONF: KLOC? Return value: 1 <enabling>
:CONFigure:ALARm <ALL,PASS, FAIL,OFF> This command sets up an alert mode Example: CONF: ALAR FAIL Example description: Alert for FAIL determination results Example: CONF: ALARm? Return value: FAIL <Alert for FAIL>

:CONFigure: PHOLd <50ms,100ms,500ms,1s,2s,5s,INFinity> This command sets up the retaining time for PASS display Example: CONF: PHOL 100ms Example description: Set up PASS display time to 100mS Example: CONF: PHOLd? Return value: +1.00000E-01 <100ms>
:CONFigure:TGWAit <NRF> This command sets up the test wait time after a trigger Example: CONF: TGWA 500mS Example description: Set up wait time after trigger to 500mS Example: CONF: TGWA? Return value: +5.00000E-01 <500ms>
:CONFigure:TMODe <SINGLE,MULTI> This command sets up the test mode Example: CONF: TMOD MULTI Example description: Set up test mode to multi-step test Example: CONF: TMOD? Return value: MULTI <multi-step mode>
:CONFigure:TMODe:MULTi:TSOUrce <AUTO,TRIG> This command sets up a trigger source between the steps of multi-step testing Example: CONF: TMOD: MULT: TSOU AUTO Example description: Set up multi-step test auto to proceed with the next step Example: :CONF: TMOD: MULT: TSOU? Return value: AUTO <auto proceed with the next step>
:CONFigure:TMODe:MULTi:BREAk <FAIL,OFF> This command sets up a test source abortion for multi-step tests Example: CONF: TMOD: MULT: BREA FAIL Example description: Set a multi-step test to stop when any one of its steps fails Example: CONF: TMOD: MULT: BREA? Return value: FAIL <stop when any one step failed>
:CONFigure:TMODe:MULTi:SIGNal <EACH,TOTAL> This command sets up a signal output method in multi-step testing Example: CONF: TMOD: MULT: SIGN TOTAL Example description: Set a multi-step test to output the overall determination signal after every step has run

Example: CONF: TMOD: MULT: SIGN? Return value: TOTAL <output overall determination signal>
:EDIT:STEP <numeric> This command sets up the step for editing. The following “EDIT” string headed command setting up step is specified by the command, e.g. after setting step 1 to be edited, all the following voltages or current values will be set to step 1. To edit step 2, it is necessary to switch to step 2 first (: EDIT: STEP 2). Example: EDIT: STEP 1 Example description: Set to edit step 1 Example: EDIT: STEP? Return value: 1 <step 1>
:EDIT: :FUNCtion < ACW,DCW,IR,CONTACT,ACW-P,DCW-P,IR-P > This command sets up the test items Example: EDIT: FUNC ACW Example description: Set the test item to ACW Example: EDIT: FUNC? Return value: ACW
:EDIT: VOLTage < NRf > This command sets up the test voltage Example: EDIT: VOLT 1kV Example description: Set the test voltage to 1kV Example: EDIT: VOLT? Return value: +1.00000E+02 <1kV>
:EDIT:FREQuency < NRf > This command sets up the frequency of test AC current Example: EDIT: FREQ 50HZ Example description: Set the frequency of test AC current to 50Hz. Example: EDIT: ACW: FREQ? Return value: +5.00000E+01 <50Hz>
: EDIT: HILImit < NRf > This command sets up the upper determination limit Example: EDIT: HILI 1mA Example description: Set the upper determination limit to 1mA Example: EDIT: HILI? Return value: +1.00000E-03 <1mA>
:EDIT: LOLImit < NRf >

This command sets up the lower determination limit Example: EDIT: LOLI 0.5mA Example description: Set the lower determination limit to 0.5mA Example: EDIT: LOLI? Return value: +5.00000E-04 <0.5mA>
:EDIT: RAMP < NRf > This command sets up the voltage rising time Example: EDIT: RAMP 0.5s Example description: Set the voltage rising time to 0.5s Example: EDIT: RAMP? Return value: +5.00000E-01 <0.5s>
:EDIT: DWELl < NRf > This command sets up the test time Example: EDIT: DWEL 1s Example description: Set the test time to 1s Example: EDIT: DWEL? Return value: +1.00000E+00 <1s>
:EDIT: CHANnel : POSItive < numeric > This command sets up the high voltage output channel Example: EDIT: CHAN: POSI 1,2,3,4 Example description: Set the high voltage output channel to 1, 2, 3, 4 Example: EDIT: CHAN: POSI? Return value: 1,2,3,4
:EDIT: CHANnel : NEGAtive < numeric > This command sets up the low voltage output channel Example: EDIT: CHAN: NEGA 5,6,7,8 Example description: Set the low voltage output channel to 5, 6, 7, 8 Example: EDIT: CHAN: NEGA? Return value: 5,6,7,8
:EDIT: CHANnel : CLOSe < numeric > This command sets up the closed channel (channels without any output) Example: EDIT: CHAN: CLOS 1,5 Example description: Set the channel 1 and 5 close Example: EDIT: CHAN: CLOS? Return value: 1,5
:EDIT: ARC < numeric > This command detects the arc sensitivity settings Example: EDIT: ARC 5

Example description: Set the arc sensitivity to 5 Example: EDIT: ARC? Return value: 5
:EDIT: OFFSet IMAG < NRf > This command sets up the reset deduction value of imaginary current. Example: EDIT: OFFS IMAG 0.002mA Example description: Set up the reset deduction value of imaginary current to 0.002mA Example: EDIT: OFFS IMAG? Return value: +2.00000E-06 <0.002mA>
:EDIT: OFFSet REAL < NRf > This command sets up the reset deduction value of real current. Example: EDIT: OFFS REAL 0.002mA Example description: Set up the reset deduction value of real current to 0.002mA Example: EDIT: OFFS REAL? Return value: +2.00000E-06 <0.002mA>
:EDIT: OPEN < NRf > This command is to set the sensitivity of open circuit detection. Example: EDIT: OPEN 200 Example description: Set up the sensitivity of open circuit detection to 200. Example: EDIT: OPEN? Return value:+2.00000E+2 <200>
:EDIT:IR:DELAy < NRf > This command sets up the IR delay determination time. Example: EDIT: IR: DELA 0.1s Example description: Set up the IR delay determination time to 0.1S Example: EDIT: IR: DELA? Return value: +1.00000E-01 <0.1s>
:EDIT: STEP:COUNt? This command queries the number of test steps. Example: EDIT: STEP: COUN? Return value: 2 <this file contains 2 steps>
:EDIT: STEP:DEL < numeric > This command deletes a test step Example: EDIT: STEP: DEL 2 Example description: Delete test step STEP2

:EDIT: STEP:ADD < numeric > This command adds a test step. Example: EDIT: STEP: ADD 2 Example description: Add test step STEP2
:EDIT: STEP:CONDition? < numeric > This command queries the test step conditions Example: EDIT: STEP: COND? 2 Example description: Query test conditions of step 2. Return value: ACW,1.00kV,50HZ,26.00mA, 0.00mA, 0.1s, 1.0s,0, 0.00mA,OFF. Sequence of conditions: test item, voltage, frequency, upper limit, lower limit, rising time, test time, arc sensitivity, reset deduction value, determination delay time
:MEASure: VOLTage? This command queries the current voltage measurement. Example: MEAS: VOLT? Return value: +1.00000E+02 <1kV>
:MEASure: CURREnt? This command queries the current measurement now. Example: MEAS: CURR? Return value: +2.00000E-06 <0.002mA>
:MEASure: RESistance? This command queries the current resistance measurement. Example: MEAS: RES? Return value: +1.20000E+10 <12G>
:MEASure:TIME? This command queries the test time elapsed up to now. Example: MEAS: TIME? Return value: +1.0000E+0 <1S>
: OPERation: STEP <numeric> This command selects the test step: desired test step for single-step test and the first step for multi-step test. Example: OPER: STEP 2 Example description: Select the test step STEP2 Example: OPERation: STEP? Return value: 2 <Means 2nd STEP>
: OPERation:FILE? This command asks for the current file name. Example:OPER:FILE?

Return vale:26983877 <Means file name is 26983877>

: RESUlt?

This command queries the test results.

Example: RESU?

Return value: 01,+9.01235E+00,+7.52562E-07,+1.19756E+07,2 with contents in the following sequence: test step ID, voltage measurement, current measurement, resistance measurement, determination results where determination results are predefined codes with the meanings defined in the table below:

Code	**Description**
1	Test Aborted
2	Determination PASS
3	Measurement value over upper limit (determination FAIL)
4	Measurement value over lower limit (determination FAIL)
5	Arc detection (determination FAIL)
6	Breaking point voltage (determination FAIL)
7	Output voltage error
8	Open fail

:STARt

This command starts a test which functions the same as the TEST key in the front panel

Example: STAR

:STOP

This command stops a test which functions the same as the ABORT key in the front panel

Example: STOP

: SYSTem: AUREply <ON , OFF, 1, 0>

This command sets up the auto reply function of RS-232

Example: SYST: AURE ON

Example description: Enable auto reply function of RS-232

Example: SYST: AURE?

Return value: ON

: SYSTem: KYSOund <ON , OFF, 1, 0>

This command sets up the key sound

Example: SYST: KYSO ON
: SYSTem: ALARm [:VOLUme]: PASS < numeric> This command sets up the volume of PASS alert Example: SYST: ALAR: PASS 1 Example description: Set the volume of PASS alert to1 Example: SYST: ALAR: PASS? Return value: 1
: SYSTem: ALARm [:VOLUme]: FAIL< numeric> This command sets up the volume of FAIL alert Example: SYST: ALAR: FAIL 5 Example description: Set the volume of FAIL alert to5 Example: SYST: ALAR: FAIL? Return value: 5
:SYSTem:ERROr? This command asks for messages in the error message queue Please refer to Appendix 1 for the error message returned. Example: SYST:ERRO? Return value :0,” No error” means there are no error messages in the queue
:TEST:EXECute This command starts test which functions the same as the TEST key in front panel Example: TEST: EXEC
:TEST:ABORt This command stops a test which functions the same as the ABORT key in the front panel Example: TEST: ABOR

Appendix 1

-100	Command error
-102	Syntax error
-103	Invalid separator
-108	Parameter not allowed
-109	Missing parameter
-112	Program mnemonic too long
-113	Undefinded header(query a command only command or query command missing '?'
-141	Invalid character data
-211	Trigger ignored
-221	Settings conflict
-222	Data out of range
-223	Too much data
-292	Reference name dose not exist
-410	Query interrupted
-420	Query unterminate