AN IKONIX BRAND

7630

Touch Current Tester

User Manual

E1.06

WARRANTY

EEC certifies that the instrument listed in this manual meets or exceeds published manufacturing specifications. This instrument was calibrated using standards that are traceable to Chinese National Laboratory Accreditation (CNLA).

Your new instrument is warranted to be free from defects in workmanship and material for a period of (3) year from date of shipment. During the warranty period, you must return the instrument to EEC or its branches or its authorized distributor for repair. EEC reserves the right to use its discretion on replacing the faulty parts or replacing the assembly or the whole unit.

Any non-authorized modifications, tampering or physical damage will void your warranty. Elimination of any connections in the earth grounding system or bypassing any safety systems will void this warranty. This warranty does not cover batteries or accessories not of EEC manufacture. Parts used must be parts that are recommended by EEC as an acceptable specified part. Use of non-authorized parts in the repair of this instrument will void the warranty.

This warranty does not cover accessories not of EEC manufacture.

Except as provided herein, EEC makes no warranties to the purchaser of this instrument and all other warranties, express or implied (including, without limitation, merchantability or fitness for a particular purpose) are hereby excluded, disclaimed and waived.

Compliance Information

Conforms with the following product standards:

EMC Standard

EN 55011:2009+A1:2010

EN 61326-1:2013

1. The product is intended for use in non-residential/non-domestic environments. Use of the product in residential/domestic environments may cause electromagnetic interference.
2. Connection of the instrument to a test object may produce radiations beyond the specified limit.
3. Use high-performance shielded interface cable to ensure conformity with the EMC standards listed above.

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1. Introduction

1.1 Safety Symbols

1.1.1 Product Marking Symbols

Product will be marked with this symbol when it is necessary to refer to the operation and service manual in order to prevent injury or equipment damage.

Product will be marked with this symbol when hazardous voltages may be present.

Product will be marked with this symbol at connections that require earth grounding.

1.1.2 Caution and Warning Symbols

Calls attention to a procedure, practice, or condition that could possibly cause bodily injury or death.

Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data

1.2 Glossary of Terms

Alternating Current, AC: Current that reverses direction on a regular basis, commonly in the U.S.A. 60 per second, in other countries 50 times per second.

Breakdown: The failure of insulation to effectively prevent the flow of current sometimes evidenced by arcing. If voltage is gradually raised, breakdown will begin suddenly at a certain voltage level. Current flow is not directly proportional to voltage. Once breakdown current has flown, especially for a period of time, the next gradual application of voltage will often show breakdown beginning at a lower voltage than initially.

Conductive: Having a volume resistivity of no more than 10^3 ohm-cm or a surface resistivity of no more than 10^5 ohms per square.

Dielectric: An insulating material that is positioned between two conductive materials in such a way that a charge or voltage may appear across the two conductive materials.

Direct Current, DC: Current that flows in one direction only. The source of direct current is said to be polarized and has one terminal that is always at a higher potential than the other.

Hipot Tester: Common term for dielectric-withstand test equipment.

Insulation: Gas, liquid or solid material which has a volume resistivity of at least 10^{12} ohm-cm and is used for the purpose of resisting current flow between conductors.

Insulation Resistance Tester: An instrument or a function of an instrument capable of measuring resistance's in excess of 200 megohms. Usually employs a higher voltage power supply than used in ohmmeters measuring up to 200 megohms.

Leakage: AC or DC current flow through insulation and over its surfaces, and AC current flow through a capacitance. Current flow is directly proportional to voltage. The insulation and/or capacitance are thought of as a constant impedance, unless breakdown occurs.

Resistance: That property of a substance that impedes current and results in the dissipation of power, in the form of heat. The practical unit of resistance is the ohm. Symbol = **R**

Trip Point: A minimum or maximum parameter set point that will cause an indication of unacceptable performance during a run test.

Voltage: Electrical pressure, the force which causes current through an electrical conductor. Symbol = **V**

1.3 Safety

This product and its related documentation must be reviewed for familiarization with safety markings and instructions before operation.

This product is a Safety Class I instrument (provided with a protective earth terminal).
Before applying power verify that the instrument is set to the correct line voltage and the correct fuse is installed (Please refer to 3.1 Specifications).

A Hipot produces voltages and currents that can cause harmful or fatal electric shock. To prevent accidental injury or death, these safety procedures must be strictly observed when handling and using the test instrument.

1.3.1 Service and Maintenance

User Service

To prevent electric shock do not remove the instrument cover. There are no user serviceable parts inside. Routine maintenance or cleaning of internal parts is not necessary. Avoid the use of cleaning agents or chemicals on the instrument, some chemicals may damage plastic parts or lettering. Any external cleaning should be done with a clean dry or slightly damp cloth. Schematics, when provided, are for reference only. Any replacement cables and high voltage components should be acquired directly from EEC. Refer servicing to EEC customer support department.

Service Interval

The instrument, its power cord, test leads, and accessories must be returned at least once a year to EEC customer support department for calibration and inspection of safety related components. EEC will not be held liable for injuries suffered if the instrument is not properly maintained and safety checked annually.

User Modifications

Unauthorized user modifications will void your warranty. EEC will not be responsible for any injuries sustained due to unauthorized equipment modifications or use of parts not specified by EEC. Instruments returned to EEC with unsafe modifications will be returned to their original operating condition at the customers expense.

1.3.2 Test Station

Location

Select an area away from the main stream of activity which employees do not walk through in performing their normal duties. If this is not practical because of production line flow, then the area should be roped off and marked for **HIGH VOLTAGE TESTING**. No employees other than the test operators should be allowed inside.

If benches are placed back-to-back, be especially careful about the use of the bench opposite the

test station. Signs should be posted: **"DANGER - HIGH VOLTAGE TEST IN PROGRESS - UNAUTHORIZED PERSONNEL KEEP AWAY."**

Work Area

Perform the tests on a non-conducting table or workbench, if possible. If you cannot avoid using a conductive surface, be certain that it is connected to a good earth ground and the high voltage connection is insulated from the grounded surface.

There should not be any metal in the work area between the operator and the location where products being tested will be positioned. Any other metal in the work area should be connected to a good ground, never left "floating".

Position the tester so the operator does not have to reach over the product under test to activate or adjust the tester. If the product or component being tested is small, it may be possible to construct guards or an enclosure around the device to be tested. Construct the guards of a non-conducting material such as clear acrylic, so that the item being tested is within the guards or enclosure during the test. If possible, the guards or enclosure should also contain safety switches that will not allow the tester to operate unless the guards are in place or the enclosure closed. Keep the area clean and uncluttered. All test equipment and test leads not necessary for the test should be removed from the test bench and put away. It should be apparent to both the operator and to any observers, the product that is being tested and the product that is waiting to be tested, or has already been tested.

Do not perform Hipot tests in a combustible atmosphere or in any area where combustible materials are present.

Power

Dielectric Voltage-Withstand Test Equipment must be connected to a good ground. Be certain that the power wiring to the test bench is properly polarized and that the proper low resistance bonding to ground is in place.

Power to the test station should be arranged so that it can be shut off by one prominently marked switch located at the entrance to the test area. In case of an emergency, anyone can cut off the power before entering the test area to offer assistance.

1.3.3 Test Operator Qualifications

This instrument generates voltages and currents that can cause **harmful or fatal electric shock** and must only be operated by a skilled worker trained in its use.

The operator should understand the electrical fundamentals of voltage, current, and resistance. They should recognize that the test instrument is a variable high-voltage power supply with the return circuit directly connected to earth ground, therefore, current from the high-voltage output

will flow through any available ground path.

Rules
Operators should be thoroughly trained to follow all of the aforementioned rules, in addition to any other applicable safety rules and procedures. Defeating any safety system should be considered a serious offense with severe penalties such as removal from the Hipot testing job. Allowing unauthorized personnel in the area during a test should also be dealt with as a serious offense.

Dress
Operators should not wear jewelry that could accidentally complete a circuit.

Medical Restrictions
Personnel with heart ailments or devices such as pacemakers should be informed that the voltages and currents generated by the instrument are very dangerous. If contacted it may cause heart-related problems that a person of good health may not experience. Please have the test operator consult their physician for recommendations.

1.3.4 Instrument Connections

Never perform a hipot test on energized circuitry or equipment.

The instrument is equipped with a safety ground connection, be sure that this is connected to a good earth ground.

Always connect the return lead first, regardless of whether the item under test is a sample of insulating material, a component tested with the high voltage test lead, or a cord-connected device with a two or three prong plug. The return lead should be connected first for any type of hipot testing.

Plug in the high voltage test lead only when it is being used. Handle its clip only by the insulator---never touch the clip directly. Be certain that the operator has control over any remote test switches connected to the Hipot. Double check the return and high voltage connections from the Hipot and the Line, Neutral, Ground and Case connections from the Line Leakage tester to be certain that they are proper and secure.

1.3.5 Device Under Test

Never touch the Device Under Test (DUT) or anything connected to it while high voltage is being applied by the hipot.

When testing with DC, always discharge the capacitance of the item under test and anything the high voltage may have contacted--such as test fixtures--before handling it or disconnecting the test leads.

HOT STICK probes can be used to discharge any capacitance in the device under test as a further safety precaution. A hot stick is a non-conducting rod about two feet long with a metal probe at the end that is connected to a wire. To discharge the device under test, two hot sticks are required. First, connect both probe wires to a good earth ground. Then touch one probe tip to the same place that the return lead was connected. While holding the first probe in place, touch the second probe tip to the same place where the high voltage lead was connected.

1.3.6 Key Safety Points to Remember

- Keep unqualified and unauthorized personnel away from the test area.
- Arrange the test station in a safe and orderly manner.
- Never touch the product or connections during a test.
- In case of any problem, turn off the high voltage first.
- Properly discharge any item tested with DC before touching connections.

1.4 Introduction to Product Safety Testing

1.4.1 The Importance of Safety Testing

Product Safety Tests are specified during the design and development stages of a product as well as in the production of the products to insure that it meets basic safety requirements. These tests are designed to verify the safety of the electrical products in that they do not jeopardize the safety of the people, domestic animals, and property of anyone who may come in contact with these products. In an era of soaring liability costs, original manufacturers of electrical and electronic products must make sure every item is as safe as possible. All products must be designed and built to prevent electric shock, even when users abuse the equipment or by-pass built in safety features.

To meet recognized safety standards, one common test is the "dielectric voltage-withstand test". Safety agencies which require compliance safety testing at both the initial product design stage and for routine production line testing include: Underwriters Laboratories, Inc. (UL), the Canadian Standards Association (CSA), the International Electrotechnical Commission (IEC), the British Standards Institution (BSI), the Association of German Electrical Engineers (VDE) and (TÜV), the Japanese Standards Association (JSI). These same agencies may also require that an insulation resistance test and high current ground bond test be performed.

1.5 The Different Types of Safety Tests

1.5.1 Dielectric Withstand Test

The principle behind a dielectric voltage - withstand test is simple. If a product will function when exposed to extremely adverse conditions, it can be assumed that the product will function in normal operating circumstances.

Common Applications of the Dielectric Withstand Test:

- Design (performance) testing: Determining design adequacy to meet service conditions.
- Production Line testing: Detecting defects in material or workmanship during processing.
- Acceptance testing: Proving minimum insulation requirements of purchased parts.
- Repair Service testing: Determine reliability and safety of equipment repairs.

The specific technique used to apply the dielectric voltage - withstand test to each product is different. During a dielectric voltage - withstand test, an electrical device is exposed to a voltage significantly higher than it normally encounters, for a specified duration of time.

During the test, all current flow from the high voltage output to the return is measured. If, during the time the component is tested, the current flow remains within specified limits, the device is assumed safe under normal conditions. The basic product design and use of the insulating material will protect the user against electrical shock.
The equipment used for this test, a dielectric-withstand tester, is often called a "hipot" (for high potential tester). The "rule of thumb" for testing is to subject the product to twice its normal operating voltage, plus 1,000 volts.
However, specific products may be tested at much higher voltages than 2X operating voltages + 1,000 volts. For example, a product designed to operate in the range between 100 to 240 volts can be tested between 1,000 to 4,000 volts or higher. Most "double insulated" products are tested at voltages much higher than the "rule of thumb".

Testing during development and prototype stages is more stringent than production run tests because the basic design of the product is being evaluated. Design tests usually are performed on only a few samples of the product. Production tests are performed on every item as it comes off the production line.

The hipot tester must also maintain an output voltage between 100% and 120% of specification. The output voltage of the hipot must have a sinusoidal waveform with a frequency between 40 to 70 Hz and has a peak waveform value that is not less than 1.3 and not more than 1.5 times the root-mean-square value.

Types of Failures only detectable with a Hipot test

- Weak Insulating Materials
- Pinholes in Insulation
- Inadequate Spacing of Components
- Pinched Insulation

Dielectric Withstand Test; AC verses DC

Please check with the Compliance Agency you are working with to see which of the two types of voltages you are authorized to use. In some cases, a Compliance Agency will allow either AC or DC testing to be done. However, in other cases the Compliance Agency only allows for an AC test. If you are unsure which specification you must comply with please contact our CUSTOMER SUPPORT DEPT.

Many safety agency specifications allow either AC or DC voltages to be used during the hipot test. When this is the case, the manufacturer must make the decision on which type of voltage to utilize. In order to do this it is important to understand the advantages and the disadvantages of both AC and DC testing.

AC testing characteristics

Most items that are hipot tested have some amount of distributed capacitance. An AC voltage cannot charge this capacitance so it continually reads the reactive current that flows when AC is applied to a capacitive load.

AC testing advantages

AC testing is generally much more accepted by safety agencies than DC testing. The main reason for this is that most items being hipot tested will operate on AC voltages. AC hipot testing offers the advantage of stressing the insulation alternately in both polarities, which more closely simulates stresses the product will see in real use.

Since AC testing cannot charge a capacitive load the current reading remains consistent from initial application of the voltage to the end of the test. Therefore, there is no need to gradually bring up the voltage since there is no stabilization required to monitor the current reading. This means that unless the product is sensitive to a sudden application of voltage the operator can immediately apply full voltage and read current without any wait time.

Another advantage of AC testing is that since AC voltage cannot charge a load there is no need to discharge the item under test after the test.

AC testing disadvantages

One disadvantage of AC testing surfaces when testing capacitive products. Again, since AC cannot charge the item under test, reactive current is constantly flowing. In many cases, the reactive component of the current can be much greater than the real component due to actual leakage.

This can make it very difficult to detect products that have excessively high leakage current.

Another disadvantage of AC testing is that the hipot has to have the capability of supplying reactive and leakage current continuously. This may require a current output that is actually much higher than is really required to monitor leakage current and in most cases is usually much higher than would be needed with DC testing. This can present increased safety risks as operators are exposed to higher currents.

DC testing characteristics
During DC hipot testing the item under test is charged. The same test item capacitance that causes reactive current in AC testing results in initial charging current which exponentially drops to zero in DC testing.

DC testing advantages
Once the item under test is fully charged, the only current flowing is true leakage current. This allows a DC hipot tester to clearly display only the true leakage of the product under test.

Another advantage to DC testing is that the charging current only needs to be applied momentarily. This means that the output power requirements of the DC hipot tester can typically be much less than what would be required in an AC tester to test the same product.

DC testing disadvantages
Unless the item being tested has virtually no capacitance, it is necessary to raise the voltage gradually from zero to the full test voltage. The more capacitive the item the more slowly the voltage must be raised. This is important since most DC hipots have failure shut off circuitry which will indicate failure almost immediately if the total current reaches the leakage threshold during the initial charging of the product under test.

Since a DC hipot does charge the item under test, it becomes necessary to discharge the item after the test.
DC testing unlike AC testing only charges the insulation in one polarity. This becomes a concern when testing products that will actually be used at AC voltages. This is an important reason that some safety agencies do not accept DC testing as an alternative to AC.

When performing AC hipot tests the product under test is actually tested with peak voltages that the hipot meter does not display. This is not the case with DC testing since a sinewave is not generated when testing with direct current. In order to compensate for this most safety agencies require that the equivalent DC test be performed at higher voltages than the AC test. The multiplying factor is somewhat inconsistent between agencies which can cause confusion concerning exactly what equivalent DC test voltage is appropriate.

1.5.2 Insulation Resistance Test

Some "dielectric analyzers today come with a built in insulation resistance tester. Typically, the IR function provides test voltages from 500 to 1,000 volts DC and resistance ranges from kilohms to gigaohms. This function allows manufacturers to comply with special compliance regulations. BABT, TÜV and VDE are agencies that may under certain conditions, require an IR test on the product before a Hipot test is performed. This typically is not a production line test but a performance design test.

The insulation resistance test is very similar to the hipot test. Instead of the go/no go indication that you get with a hipot test the IR test gives you an insulation value usually in Megohms. Typically, the higher the insulation resistance value the better the condition of the insulation. The connections to perform the IR test are the same as the hipot test. The measured value represents the equivalent resistance of all the insulation which exists between the two points and any component resistance which might also be connected between the two points.

Although the IR test can be a predictor of insulation condition it does not replace the need to perform a dielectric withstand test.

1.5.3 Ground Bond Test

The Ground Bonding test determines whether the safety ground circuit of the product under test can adequately handle fault current if the product should ever become defective. A low impedance ground system is critical in ensuring that in case of a product failure, a circuit breaker on the input line will act quickly to protect the user from any serious electrical shock.

International compliance agencies such as CSA, IEC, TÜV, VDE, BABT and others, have requirements calling out this test. This test should not be confused with low current continuity tests that are also commonly called out in some safety agency specifications. A low current test merely indicates that there is a safety ground connection. It does not completely test the integrity of that connection.

Compliance agency requirements vary on how different products are to be tested. Most specifications call for test currents of between 10 and 40 amps. Test voltages at these currents are typically required to be less than 12 volts. Maximum allowable resistance readings of the safety ground circuit are normally between 100 and 200 milliohms.
If you are testing a product that is terminated in a three-prong plug, you are required to perform a continuity or ground bond test on the ground conductor to the chassis or dead metal of the product.

1.5.4 Run Test

All manufacturers of a product that runs on line power normally need to run the DUT (Device Under Test) after final safety testing so that they can verify the functionality of their products. In addition to running the DUT to test its basic functionality many customers also require some basic test data to be recorded while the DUT is powered up. A Run Test System allows the product to be

powered up immediately after the safety tests are completed with a single connection to the DUT. Measurements that are commonly made while the DUT is running can include Amperage, Voltage, Watts and Power Factor.

1.5.5 Touch Current Test

The Line Leakage test is one of many product safety tests that are normally specified for electrical products by safety testing agencies such as Underwriters Laboratories (UL) and the International Electrotechnical Committee (IEC). The line leakage specifications vary as well as the method in which the measurements are taken depending upon the application or function of a product and the standard to which the product is being tested.

Current Leakage or Line Leakage tests are general terms that actually describe three different types of tests. These tests are Earth Leakage Current, Enclosure Leakage Current, and Applied Part Leakage Current. The main differences in these tests are in the placement of the probe for the measuring device. The Earth Leakage Current is the leakage current that flows through the ground conductor in the line cord back to earth. The Enclosure Leakage Current is the current that flows from any enclosure part through a person back to ground if it were contacted by a person. The Applied Part Leakage Current or Patient Lead Leakage Current is any leakage that flows from an applied part, between applied parts or into an applied part. The Applied Part Leakage Current test is required only for medical equipment. All of these tests are used to determine if products can be safely operated or handled without posing a shock hazard to the user.

Line Leakage Testers provide the capability of meeting the line leakage test specified in the following standards; UL 544, IEC 950, UL 1950, IEC 601-1, UL 2601, UL 1563, UL 3101, IEC 1010 and others. The Line Leakage test, is a test which measures the leakage current of a product, through a circuit that is designed to simulate the impedance of the human body. The simulation circuit is called the Measuring Device (MD). The instrument has five different MD circuits, selectable through the menu, which are representative circuits designed to simulate the impedance of the human body under different conditions. The impedance of the human body will vary depending upon point of contact, the surface area of the contact and the path the current flows. For these reasons, the specifications of the Measuring Devices are different depending upon the type of test being performed as well as the maximum allowable leakage current. Leakage current measurements are performed on products under normal conditions and single fault conditions as well as reversed polarity. This simulates possible problems, which could occur if the product under test is faulted or misused while the product is operating under high line conditions (110% of the highest input voltage rating of the product).

Line Leakage tests are normally specified as “Type Tests” or “Design Tests” which are performed during the development of the product. This helps verify that the design is safe but it does not guarantee the safety of the products being produced on the production line. The only way to be sure you are shipping safe products is to test each product at the end of the production line. The user may perform a Leakage Current test along with other common safety test such as Dielectric Withstand, Insulation Resistance, and Ground Bond on the production line with a single connection to the device under test.

2. Getting Started

This section contains information for the unpacking, inspection, preparation for use and storage of your EEC product.

2.1. Unpacking and Inspection

2.1.1 Packaging

Your instrument was shipped in a custom foam insulated container that complies with ASTM D4169-92a Assurance Level II Distribution Cycle 13 Performance Test Sequence
If the shipping carton is damaged, inspect the contents for visible damage such as dents, scratches or broken display. If the instrument is damaged, notify the carrier and EEC's customer support department. Please save the shipping carton and packing material for the carriers inspection. Our customer support department will assist you in the repair or replacement of your instrument. Please do not return your product without first notifying us. Please retain all of the original packaging materials.

Contents of the Carton

Inside the carton should be the following:

Description	Part No.
7630	
Operation Manual	
Fuse *1	F2A-2S
10A Power Cord *1	WC-10-YP03
Interlock Key	2-KEY-02-A00 (Please install the interlock key in the rear panel before instrument has been used.)
DUT Input Power Lead *1	1151
40A DUT Power Cable *1 (For 7630 without OPT. 753)	1148
Hipot Return Lead *2 (For 7630 without OPT. 753)	1102
OPT.753 HV & GB Link Module	
TC Receptacle Adaptor Box *1	1932
Hipot Link Lead *1	1105
DUT Power & HV Cable 40A / 4KV *1	1149
Hipot Test Lead *2	1101
Y type terminal	3-TM-5.5-6-Y
Insulating sleeve (Black sleeve*1 & Green sleev *1)	3-V-5.5B, 3-V-5.5R
1931 & 1931S Series Transformer Box	
RS485 cable	1220

2.1.2 Returning the Instrument

When it is necessary to return the instrument for servicing or calibration, repackage the instrument in its original container, please include all accessories and test leads. Indicate the nature of the problem or type of service needed. Also, please mark the container "FRAGILE" to insure proper handling.

If you do not have the original packaging materials, please follow these guidelines:

- Wrap the instrument in a bubble pack or similar foam. Enclose the same information as above.
- Use a strong double-wall container that is made for shipping instrumentation. 350 lb. test material is adequate.
- Use a layer of shock-absorbing material 70 to 100 mm (3 to 4 inch) thick around all sides of the instrument. Protect the control panel with cardboard.
- Seal the container securely.
- Mark the container "FRAGILE" to insure proper handling.

2.2 Installation

2.2.1 Work Area

Locate a suitable testing area and be sure you have read all safety instructions for the operation of the instrument and suggestions on the test area set-up in the Safety section. Make sure the work area you choose has a three-prong grounded outlet. Be sure the outlet has been tested for proper wiring before connecting the instrument to it.

2.2.2 Power Requirements

This instrument requires a power source of either 115 volts AC ± 15%, 47~63 Hz single phase or 230 volts AC ±15%, 47~63 Hz single phase. Please check the rear panel to be sure the proper switch setting is selected for your line voltage requirements before turning your instrument on. AT the same time, please must use the sure fuse for the instrument. It's specification is marked in rear panel of instrument. Please must turn off input power to avoid dangerous before replace the fuse.

Do not switch the line voltage selector switch located on the rear panel while the instrument is on or operating. This may cause internal damage and represents a safety risk to the operator.

2.2.3 Basic Connections

Power Cable

Before connecting power to this instrument, the protective ground (Earth) terminals of this instrument must be connected to the protective conductor of the line (mains) power cord. The main plug shall only be

inserted in a socket outlet (receptacle) provided with a protective ground (earth) contact. This protective ground (earth) **must not be defeated** by the use of an extension cord without a protective conductor (grounding).

The instrument is shipped with a three-wire power cable. When the cable is connected to an appropriate AC power source, the cable will connect the chassis to earth ground. The type of power cable shipped with each instrument depends on the country of destination.

Return Connection

The output power supplies of this instrument are referenced directly to earth ground. Any conductor that completes a path between the high voltage and earth ground will form a completed circuit.

When the instrument Return is grounded, any internal and external stray leakage will be monitored due to currents that flow from High Voltage to earth ground (such as from HV to the chassis of the instrument). This current is inherent and will cause errors when trying to monitor very low leakage currents in the micoamp range.

2.2.4 Environmental Conditions

This instrument may be operated in environments with the following limits:
Temperature…… 0° - 40° C
Relative humidity ……20 - 80%
Altitude ……6,560 feet (2,000 meters)
Use insulation resistance function before, should be warmed-up 30 minutes.

Storage and Shipping Environment

This instrument may be stored or shipped in environments with the following limits:

Temperature.....- 40°- 75°C
Altitude.....25000 feet (7,620 meters)

The instrument should also be protected against temperature extremes that may cause condensation within the instrument.

3. Specifications and Controls

3.1 Specifications

MODEL			7630		
INPUT					
Voltage	115V / 230Vac ± 15%				
Frequency	50Hz / 60Hz ± 5%				
Current	max. 2A				
Line Condition					
Power Switch	Reverse polarity switch for normal condition (on / off / auto setting)				
Neutral Switch	Neutral switch on / off selection for single fault condition				
Ground Switch	Ground switch on / off selection for class I single fault condition				
Probe Setting					
Surface to Surface (PH - PL)					
Surface to Line (PH - L)					
Ground to Line (G - L)					
Ground to Neutral (G - N)					
Auto Function (G - N & G - L)					
SETTING					
Touch Current High / Low Limit (AC+DC/ AC/ DC)	Range		0.0uA - 999.9uA / 1000uA - 9999uA / 10.00mA - 20.00mA		
	Resolution		0.1uA / 1uA / 0.01mA		
Touch Current High / Low Limit (Peak)	Range		0.0uA - 999.9uA / 1000uA - 9999uA / 10.00mA - 30.00mA		
	Resolution		0.1uA / 1uA / 0.01mA		
DISPLAY					
Touch Current & Imax Display (RMS)	Auto Range	Ranges	MD Major Resistance is 0.5KΩ	MD Major Resistance is 1KΩ	MD Major Resistance is 1.5KΩ
		Range 1	0.0uA - 64.0uA	0.0uA - 32.0uA	0.0uA - 22.0uA
		Resolution	0.1uA	0.1uA	0.1uA
		Range 2	56.0uA - 260.0uA	28.0uA - 130.0uA	18.3uA - 85.0uA
		Resolution	0.1uA	0.1uA	0.1uA
		Range 3	240.0uA - 999.9uA, 1000uA - 1050uA	120.0uA - 525.0uA	80.0uA - 350.0uA
		Resolution	0.1uA / 1uA	0.1uA	0.1uA
		Range 4	800.0uA - 999.9uA, 1000 - 4200uA	400.0uA - 999.9uA, 1000uA - 2100uA	266.6uA - 999.9uA, 1000uA - 1400uA
		Resolution	0.1uA / 1uA	0.1uA / 1uA	0.1uA / 1uA
		Range 5	3600uA - 8399uA, 8.4mA - 16.80mA	1800uA - 8400uA	1200uA - 5600uA
		Resolution	1uA / 0.01mA	1uA	1uA

		Range 6	16.00mA - 20.00mA	8000uA - 8399uA, 8.40mA - 20.00mA	5300uA - 8399uA, 8.40mA - 20.00mA
		Resolution	0.01mA	1uA / 0.01mA	1uA / 0.01mA
		Accuracy (AC + DC)			
		Range 1 - 5[*1]	DC : ± 2% of reading + 3 counts		
			15Hz < f < 100kHz : ± 2% of reading + 3 counts		
			100kHz < f < 1MHz : ± 5% of reading (> 10.0uA)		
		Range 6[*1]	DC, 15Hz < f < 100KHz : ± 5% of reading (> 10.0uA)		
		Accuracy (AC)[*2]			
		Range 1 - 5[*1]	15Hz < f < 30Hz : ± 3% of reading + 5 counts		
			30Hz < f < 100kHz : ± 2% of reading + 3 counts		
			100kHz < f < 1MHz : ± 5% of reading (> 10.0uA)		
		Range 6[*1]	15Hz < f <100kHz : ± 5% of reading (> 10.0uA)		
		Accuracy (DC)[*3]			
		Range 1 - 5[*1]	DC : ± 2% of reading + 3 counts (> 10.0uA)		
		Range 6[*1]	DC : ± 5% of reading (> 10.0uA)		
	Fixed Range > 6% of Range	Ranges	MD Major Resistance is 0.5KΩ	MD Major Resistance is 1KΩ	MD Major Resistance is 1.5KΩ
		Range 1	0.0uA - 64.0uA	0.0uA - 32.0uA	0.0uA - 22.0uA
		Resolution	0.1uA	0.1uA	0.1uA
		Range 2	15.6uA - 260.0uA	7.8uA - 130.0uA	5.1uA - 85.0uA
		Resolution	0.1uA	0.1uA	0.1uA
		Range 3	63uA - 1050uA	31.5uA - 525.0uA	21.0uA - 350.0uA
		Resolution	1uA	0.1uA	0.1uA
		Range 4	252uA - 4200uA	126uA - 2100uA	84uA - 1400uA
		Resolution	1uA	1uA	1uA
		Range 5	1008uA - 8399uA, 8.4mA - 16.80mA	504uA - 8400uA	336uA - 5600uA
		Resolution	1uA / 0.01mA	1uA	1uA
		Range 6	1200uA - 8399uA, 8.40mA - 20.00mA	1200uA - 8399uA, 8.40mA - 20.00mA	1200uA - 8399uA, 8.40mA - 20.00mA
		Resolution	1uA / 0.01mA	1uA / 0.01mA	1uA / 0.01mA
		Accuracy (AC + DC)			
		Range 1 - 5[*1]	DC, 15Hz < f < 100kHz : ± 2% of reading + 3 counts		
			100kHz < f < 1MHz : ± 5% of reading (> 10.0uA)		
		Range 6[*1]	DC, 15Hz < f < 100kHz : ± 5% of reading (> 10.0uA)		
		Accuracy (AC)[*2]			
		Range 1 - 5[*1]	15Hz < f < 30Hz : ± 3% of reading + 5 counts		
			30Hz < f < 100kHz : ± 2% of reading + 3 counts		
			100kHz < f < 1MHz : ± 5% of reading (> 10.0uA)		
		Range 6[*1]	15Hz < f < 100kHz : ± 5% of reading (> 10.0uA)		

		Accuracy (DC)[*3]			
		Range 1 - 5[*1]	DC : ± 2% of reading + 3 counts (> 10.0uA)		
		Range 6[*1]	DC : ± 5% of reading (> 10.0uA)		
	Fixed Range < 6% of Range	Ranges	MD Major Resistance is 0.5KΩ	MD Major Resistance is 1KΩ	MD Major Resistance is 1.5KΩ
		Range 1	N / A	N / A	N / A
		Resolution	N / A	N / A	N / A
		Range 2	0.0uA - 15.6uA	0.0uA - 7.8uA	0.0uA - 5.1uA
		Resolution	0.1uA	0.1uA	0.1uA
		Range 3	0uA - 63uA	0.0uA - 31.5uA	0.0uA - 21.0uA
		Resolution	1uA	0.1uA	0.1uA
		Range 4	0uA - 252uA	0uA - 126uA	0uA - 84uA
		Resolution	1uA	1uA	1uA
		Range 5	0uA - 1008uA	0uA - 504uA	0uA - 336uA
		Resolution	1uA	1uA	1uA
		Range 6	0uA - 1200uA	0uA - 1200uA	0uA - 1200uA
		Resolution	1uA	1uA	1uA
		Accuracy (AC + DC)			
		Range 1 - 5[*1]	DC, 15Hz < f < 100kHz : (± 2% of reading + 3 counts) + (2% of reading + 0.2% of range)		
			100kHz < f < 1MHz : (± 5% of reading (> 10.0uA)) + (2% of reading + 0.5% of range)		
		Range 6[*1]	DC, 15Hz < f < 100kHz: (± 5% of reading (> 10.0uA)) + (2% of reading + 0.2% of range)		
		Accuracy (AC)[*2]			
		Range 1 - 5[*1]	15Hz < f <30Hz : (± 3% of reading + 5 counts) + (2% of reading + 0.2% of range)		
			30Hz < f <100kHz : (± 2% of reading + 3 counts) + (2% of reading + 0.2% of range)		
			100kHz < f < 1MHz : (± 5% of reading (> 10.0uA)) + (2% of reading + 0.5% of range)		
		Range 6[*1]	15Hz < f <100kHz : (± 5% of reading (> 10.0uA)) + (2% of reading + 0.2% of range)		
		Accuracy (DC)[*3]			
		Range 1 - 5[*1]	DC : (± 2% of reading + 3 counts (> 10.0uA)) + (2% of reading + 0.2% of range)		
		Range 6[*1]	DC : (± 5% of reading (> 10.0uA)) + (2% of reading + 0.2% of range)		
Touch Current & Imax Display (Peak)	Auto Range	Ranges	MD Major Resistance is 0.5KΩ	MD Major Resistance is 1KΩ	MD Major Resistance is 1.5KΩ
		Range 1	0.0uA - 64.0uA	0.0uA - 32.0uA	0.0uA - 22.0uA
		Resolution	0.1uA	0.1uA	0.1uA

		Range 2	56.0uA - 260.0uA	28.0uA - 130.0uA	18.3uA - 85.0uA
		Resolution	0.1uA	0.1uA	0.1uA
		Range 3	240.0uA - 999.9uA, 1000uA - 1050uA	120.0uA - 525.0uA	80.0uA - 350.0uA
		Resolution	0.1uA / 1uA	0.1uA	0.1uA
		Range 4	800.0uA - 999.9uA, 1000uA - 4200uA	400.0uA - 999.9uA, 1000uA - 2100uA	266.6uA - 999.9uA, 1000uA - 1400uA
		Resolution	0.1uA / 1uA	0.1uA / 1uA	0.1uA / 1uA
		Range 5	3600uA - 8399uA, 8.40mA - 16.80mA	1800uA - 8400uA	1200uA - 5600uA
		Resolution	1uA / 0.01mA	1uA	1uA
		Range 6	16.00mA - 30.00mA	8000uA - 8399uA, 8.40mA - 30.00mA	5300uA - 8399uA, 8.40mA - 30.00mA
		Resolution	0.01mA	1uA / 0.01mA	1uA / 0.01mA
		Accuracy (AC + DC)			
		Range 1 - 5[*1]	DC : ± 2% of reading + 3 counts		
			15Hz < f < 1MHz : ± 10% of reading + 2uA		
		Range 6[*1]	DC : ± 2% of reading + 3 counts		
			15Hz < f < 100kHz : ± 10% of reading + 2counts		
		Accuracy (AC)[*2]			
		Range 1 - 5	15Hz < f < 1MHz : ± 10% of reading + 2uA		
		Range 6	15Hz < f < 100kHz : ± 10% of reading + 2counts		
	Fixed Range > 6% of Range	Ranges	MD Major Resistance is 0.5KΩ	MD Major Resistance is 1KΩ	MD Major Resistance is 1.5KΩ
		Range 1	0.0uA - 64.0uA	0.0uA - 32.0uA	0.0uA - 22.0uA
		Resolution	0.1uA	0.1uA	0.1uA
		Range 2	15.6uA - 260.0uA	7.8uA - 130.0uA	5.1uA - 85.0uA
		Resolution	0.1uA	0.1uA	0.1uA
		Range 3	63uA - 1050uA	31.5uA - 525.0uA	21.0uA - 350.0uA
		Resolution	1uA	0.1uA	0.1uA
		Range 4	252uA - 4200uA	126uA - 2100uA	84uA - 1400uA
		Resolution	1uA	1uA	1uA
		Range 5	1008uA - 8399uA, 8.40mA - 16.80mA	504uA - 8400uA	336uA - 5600uA
		Resolution	1uA / 0.01mA	1uA	1uA
		Range 6	1800uA - 8399uA, 8.40mA - 30.00mA	1800uA - 8399uA, 8.40mA - 30.00mA	1800uA - 8399uA, 8.40mA - 30.00mA
		Resolution	1uA / 0.01mA	1uA / 0.01mA	1uA / 0.01mA
		Accuracy (AC + DC)			
		Range 1 - 5[*1]	DC : ± 2% of reading + 2uA		
			15Hz < f < 100kHz : ± 10% of reading + 2uA		

			100kHz < f < 1MHz : ± 10% of reading + 2uA		
		Range 6*1	DC : ± 2% of reading + 3 counts		
			15Hz < f < 100kHz : ± 10% of reading + 2 counts		
		Accuracy (AC)*2			
		Range 1 - 5*1	15Hz < f < 100kHz : ± 10% of reading + 2uA		
			100kHz < f < 1MHz : ± 10% of reading + 2uA		
		Range 6*1	15Hz < f < 100kHz : ± 10% of reading + 2 counts		
	Fixed Range < 6% of Range	Ranges	MD Major Resistance is 0.5KΩ	MD Major Resistance is 1KΩ	MD Major Resistance is 1.5KΩ
		Range 1	N / A	N / A	N / A
		Resolution	N / A	N / A	N / A
		Range 2	0.0uA - 15.6uA	0.0uA - 7.8uA	0.0uA - 5.1uA
		Resolution	0.1uA	0.1uA	0.1uA
		Range 3	0uA - 63uA	0.0uA - 31.5uA	0.0uA - 21.0uA
		Resolution	1uA	0.1uA	0.1uA
		Range 4	0uA - 252uA	0uA - 126uA	0uA - 84uA
		Resolution	1uA	1uA	1uA
		Range 5	0uA - 1008uA	0uA - 504uA	0uA - 336uA
		Resolution	1uA	1uA	1uA
		Range 6	0uA - 1800uA	0uA - 1800uA	0uA - 1800uA
		Resolution	1uA	1uA	1uA
		Accuracy (AC + DC)			
		Range 1 - 5*1	DC : (± 2% of reading + 2uA) + (2% of reading + 0.2% of range)		
			15Hz < f < 100kHz : (± 10% of reading + 2uA) + (2% of reading + 0.2% of range)		
			100kHz < f < 1MHz : (± 10% of reading + 2uA) + (2% of reading + 0.5% of range)		
		Range 6*1	DC : (± 2% of reading + 3 counts) + (2% of reading + 0.2% of range)		
			15Hz < f < 100kHz : (± 10% of reading + 2 counts) + (2% of reading + 0.2% of range)		
		Accuracy (AC)*2			
		Range 1 - 5*1	15Hz < f < 100kHz : (± 10% of reading + 2uA) + (2% of reading + 0.2% of range)		
			100kHz < f < 1MHz : (± 10% of reading + 2uA) + (2% of reading + 0.5% of range)		
		Range 6*1	15Hz < f <100kHz : (± 10% of reading + 2 counts) + (2% of reading + 0.2% of range)		
Touch Voltage Display (RMS)	Auto Range	Ranges	MD Major Resistance is 0.5KΩ	MD Major Resistance is 1KΩ	MD Major Resistance is 1.5KΩ
		Range 1	0.0mV - 32.0mV	0.0mV - 32.0mV	0.0mV - 32.0mV
		Resolution	0.1mV	0.1mV	0.1mV

		Range 2	28.0mV - 130.0mV	28.0mV - 130.0mV	28.0mV - 130.0mV
		Resolution	0.1mV	0.1mV	0.1mV
		Range 3	120.0mV - 525.0mV	120.0mV - 525.0mV	120.0mV - 525.0mV
		Resolution	0.1mV	0.1mV	0.1mV
		Range 4	400.0mV - 999.9mV, 1000mV - 2100mV	400.0mV - 999.9mV, 1000mV - 2100mV	400.0mV - 999.9mV, 1000mV - 2100mV
		Resolution	0.1mV / 1mV	0.1mV / 1mV	0.1mV / 1mV
		Range 5	1800mV - 8400mV	1800mV - 8400mV	1800mV - 8400mV
		Resolution	1mV	1mV	1mV
		Range 6	8000mV - 8399mV, 8.40V - 10.00V	8000mV - 8399mV, 8.40V - 20.00V	8000mV - 8399mV, 8.40V - 30.00V
		Resolution	1mV / 0.01V	1mV / 0.01V	1mV / 0.01V
		Accuracy (AC + DC)			
		Range 1 - 5[*1]	DC : ± 2% of reading + 3 counts		
			15Hz < f < 100kHz : ± 2% of reading + 3 counts		
			100kHz < f < 1MHz : ± 5% of reading (> 10.0mV)		
		Range 6[*1]	DC, 15Hz < f < 100KHz : ± 5% of reading (> 10.0mV)		
		Accuracy (AC)[*2]			
		Range 1 - 5[*1]	15Hz < f < 30Hz : ± 3% of reading + 5 counts		
			30Hz < f <100kHz : ± 2% of reading + 3 counts		
			100kHz < f < 1MHz : ± 5% of reading (> 10.0mV)		
		Range 6[*1]	15Hz < f < 100kHz : ± 5% of reading (> 10.0mV)		
		Accuracy (DC)[*3]			
		Range 1 - 5[*1]	DC : ± 2% of reading + 3 counts (> 10.0mV)		
		Range 6[*1]	DC : ± 5% of reading (> 10.0mV)		
	Fixed Range > 6% of Range	Ranges	MD Major Resistance is 0.5KΩ	MD Major Resistance is 1KΩ	MD Major Resistance is 1.5KΩ
		Range 1	0.0mV - 32.0mV	0.0mV - 32.0mV	0.0mV - 32.0mV
		Resolution	0.1mV	0.1mV	0.1mV
		Range 2	7.8mV - 130.0mV	7.8mV - 130.0mV	7.8mV - 130.0mV
		Resolution	0.1mV	0.1mV	0.1mV
		Range 3	31mV - 525mV	31.5mV - 525.0mV	31.5mV - 525.0mV
		Resolution	1mV	0.1mV	0.1mV
		Range 4	126mV - 2100mV	126mV - 2100mV	126mV - 2100mV
		Resolution	1mV	1mV	1mV
		Range 5	504mV - 8400mV	504mV - 8400mV	504mV - 8400mV
		Resolution	1mV	1mV	1mV
		Range 6	600mV - 8399mV 8.40V - 10.00V	1200mV - 8399mV, 8.40V - 20.00V	1800mV - 8399mV, 8.40V - 30.00V
		Resolution	1mV / 0.01V	1mV / 0.01V	1mV / 0.01V
		Accuracy (AC + DC)			

		Range 1 - 5[*1]	DC, 15Hz < f < 100kHz : ± 2% of reading + 3 counts		
			100kHz < f < 1MHz : ± 5% of reading (> 10.0mV)		
		Range 6[*1]	DC, 15Hz < f < 100kHz : ± 5% of reading (> 10mV)		
		Accuracy (AC)[*2]			
		Range 1 - 5[*1]	15Hz < f < 30Hz : ± 3% of reading + 5 counts		
			30Hz < f < 100kHz : ± 2% of reading + 3 counts		
			100kHz < f < 1MHz : ± 5% of reading (> 10.0mV)		
		Range 6[*1]	15Hz < f < 100kHz : ± 5% of reading (> 10mV)		
		Accuracy (DC)[*3]			
		Range 1 - 5[*1]	DC : ± 2% of reading + 3 counts (> 10.0mV)		
		Range 6[*1]	DC : ± 5% of reading (> 10mV)		
	Fixed Range < 6% of Range	Ranges	MD Major Resistance is 0.5KΩ	MD Major Resistance is 1KΩ	MD Major Resistance is 1.5KΩ
		Range 1	N / A	N / A	N / A
		Resolution	N / A	N / A	N / A
		Range 2	0.0mV - 7.8mV	0.0mV - 7.8mV	0.0mV - 7.8mV
		Resolution	0.1mV	0.1mV	0.1mV
		Range 3	0mV - 31mV	0.0mV - 31.5mV	0.0mV - 31.5mV
		Resolution	1mV	0.1mV	0.1mV
		Range 4	0mV - 126mV	0mV - 126mV	0mV - 126mV
		Resolution	1mV	1mV	1mV
		Range 5	0mV - 504mV	0mV - 504mV	0mV - 504mV
		Resolution	1mV	1mV	1mV
		Range 6	0mV - 600mV	0mV - 1200mV	0mV - 1800mV
		Resolution	1mV	1mV	1mV
		Accuracy (AC + DC)			
		Range 1 - 5[*1]	DC, 15Hz < f < 100kHz : (± 2% of reading + 3 counts) + (2% of reading + 0.2% of range)		
			100kHz < f < 1MHz : (± 5% of reading (> 10.0mV)) + (2% of reading + 0.5% of range)		
		Range 6[*1]	DC, 15Hz < f < 100kHz : (±5% of reading (> 10mV)) + (2% of reading + 0.2% of range)		
		Accuracy (AC)[*2]			
		Range 1 - 5[*1]	15Hz < f <30Hz : (± 3% of reading + 5 counts) + (2% of reading + 0.2% of range)		
			30Hz < f < 100kHz : (± 2% of reading + 3 counts) + (2% of reading + 0.2% of range)		
			100kHz < f < 1MHz : (± 5% of reading (> 10.0mV)) + (2% of reading + 0.5% of range)		
		Range 6[*1]	15Hz < f <100kHz : (± 5% of reading (> 10mV)) + (2% of reading + 0.2% of range)		

		Accuracy (DC)[*3]			
		Range 1 - 5[*1]	DC : (± 2% of reading + 3 counts (> 10.0mV)) + (2% of reading + 0.2% of range)		
		Range 6[*1]	DC : (± 5% of reading (> 10mV)) + (2% of reading + 0.2% of range)		
Touch Voltage Display (Peak)	Auto Range	Ranges	MD Major Resistance is 0.5KΩ	MD Major Resistance is 1KΩ	MD Major Resistance is 1.5KΩ
		Range 1	0.0mV - 32.0mV	0.0mV - 32.0mV	0.0mV - 32.0mV
		Resolution	0.1mV	0.1mV	0.1mV
		Range 2	28.0mV - 130.0mV	28.0mV - 130.0mV	28.0mV - 130.0mV
		Resolution	0.1mV	0.1mV	0.1mV
		Range 3	120.0mV - 525.0mV	120.0mV - 525.0mV	120.0mV - 525.0mV
		Resolution	0.1mV	0.1mV	0.1mV
		Range 4	400.0mV - 999.9mV, 1000mV - 2100mV	400.0mV - 999.9mV, 1000mV - 2100mV	400.0mV - 999.9mV, 1000mV - 2100mV
		Resolution	0.1mV / 1mV	0.1mV / 1mV	0.1mV / 1mV
		Range 5	1800mV - 8400mV	1800mV - 8400mV	1800mV - 8400mV
		Resolution	0.1mV / 1mV	0.1mV / 1mV	0.1mV / 1mV
		Range 6	8000mV - 8399mV, 8.40V - 15.00V	8000mV - 8399mV, 8.40V - 30.00V	8000mV - 8399mV, 8.40V - 45.00V
		Resolution	1mV / 0.01V	1mV / 0.01V	1mV / 0.01V
		Accuracy (AC + DC)			
		Range 1 - 5[*1]	DC : ± 2% of reading + 3 counts		
			15Hz < f < 1MHz : ± 10% of reading + 2mV		
		Range 6[*1]	DC : ± 2% of reading + 3 counts		
			15Hz < f < 100kHz : ± 10% of reading + 2 counts		
		Accuracy (AC)[*2]			
		Range 1 - 5[*1]	15Hz < f <1MHz : ± 10% of reading + 2mV		
		Range 6[*1]	15Hz < f < 100kHz : ±10% of reading + 2 counts		
	Fixed Range > 6% of Range	Ranges	MD Major Resistance is 0.5KΩ	MD Major Resistance is 1KΩ	MD Major Resistance is 1.5KΩ
		Range 1	0.0mV - 32.0mV	0.0mV - 32.0mV	0.0mV - 32.0mV
		Resolution	0.1mV	0.1mV	0.1mV
		Range 2	7.8mV - 130.0mV	7.8mV - 130.0mV	7.8mV - 130.0mV
		Resolution	0.1mV	0.1mV	0.1mV
		Range 3	31mV - 525mV	31.5mV - 525.0mV	31.5mV - 525.0mV
		Resolution	1mV	0.1mV	0.1mV
		Range 4	126mV - 2100mV	126mV - 2100mV	126mV - 2100mV
		Resolution	1mV	1mV	1mV
		Range 5	504mV - 8400mV	504mV - 8400mV	504mV - 8400mV
		Resolution	1mV	1mV	1mV

		Range 6	900mV - 8399mV, 8.40V - 15.00V	1800mV - 8399mV, 8.40V - 30.00V	2700mV - 8399mV, 8.40V - 45.00V
		Resolution	1mV / 0.01V	1mV / 0.01V	1mV / 0.01V
		Accuracy (AC + DC)			
		Range 1 - 5[*1]	DC : ± 2% of reading + 2mV		
			15Hz < f < 100kHz : ± 10% of reading + 2mV		
			100kHz < f < 1MHz : ± 10% of reading + 2mV		
		Range 6[*1]	DC : ± 2% of reading + 3 counts		
			15Hz < f <100kHz : ± 10% of reading + 2 counts		
		Accuracy (AC)[*2]			
		Range 1 - 5[*1]	15Hz < f < 100kHz : ± 10% of reading + 2mv		
			100kHz < f < 1MHz : ± 10% of reading + 2mV		
		Range 6[*1]	15Hz < f < 100kHz : ± 10% of reading + 2 counts		
	Fixed Range < 6% of Range	Ranges	MD Major Resistance is 0.5KΩ	MD Major Resistance is 1KΩ	MD Major Resistance is 1.5KΩ
		Range 1	N / A	N / A	N / A
		Resolution	N / A	N / A	N / A
		Range 2	0.0mV - 7.8mV	0.0mV - 7.8mV	0.0mV - 7.8mV
		Resolution	0.1mV	0.1mV	0.1mV
		Range 3	0mV - 31mV	0.0mV - 31.5mV	0.0mV - 31.5mV
		Resolution	1mV	0.1mV	0.1mV
		Range 4	0mV - 126mV	0mV - 126mV	0mV - 126mV
		Resolution	1mV	1mV	1mV
		Range 5	0mV - 504mV	0mV - 504mV	0mV - 504mV
		Resolution	1mV	1mV	1mV
		Range 6	0mV - 900mV	0mV - 1800mV	0mV - 2700mV
		Resolution	1mV	1mV	1mV
		Accuracy (AC + DC)			
		Range 1 - 5[*1]	DC : (± 2% of reading + 2mV) + (2% of reading + 0.2% of range)		
			15Hz < f < 100kHz : (± 10% of reading + 2mV) + (2% of reading + 0.2% of range)		
			100kHz < f < 1MHz : (± 10% of reading + 2mV) + (2% of reading + 0.5% of range)		
		Range 6[*1]	DC : (± 2% of reading + 3 counts) + (2% of reading + 0.2% of range)		
			15Hz < f <100kHz : (± 10% of reading + 2counts) + (2% of reading + 0.2% of range)		
		Accuracy (AC)[*2]			
		Range 1 - 5[*1]	15Hz < f <100kHz : (± 10% of reading + 2mv) + (2% of reading + 0.2% of range)		
			100kHz < f < 1MHz : (± 10% of reading + 2mV) + (2% of reading +		

			0.5% of range)
		Range 6[*1]	15Hz < f < 100kHz : (± 10% of reading + 2 counts) + (2% of reading + 0.2% of range)
Measuring Device Module			
MD1	IEC60990 Fig4 U2, IEC 60950 - 1, IEC60335 - 1, IEC60598 - 1, IEC60065, IEC61010, IEC62368		
	IEC60990 Fig4 U1		
MD2	IEC60990 Fig5 U3, IEC60598 - 1, IEC62368		
	IEC60990 Fig5 U1		
MD3	IEC 60601 - 1		
MD4	UL544NP, UL484 , UL923, UL471, UL867, UL697		
MD5	UL544P		
MD6	UL1563		
MD7	IEC60950, IEC61010 - 1 FigA.2 (2K ohm) for RUN Test MD Circuit (Opt.752)		
External MD & Frequency check	Basic measuring element 1kΩ		
MD Components	Accuracy : Capacitor : ± 5%; Resistance : ± 1%		
MD Voltage Limit	Maximum 70 Vpeak or 70 VDC		
Leakage Current Offset	Range : 0 - 6500uA		
DUT POWER			
AC Voltage	0.0 - 277.0V		
AC Current	40Arms max continuous		
Over Current Protection	50Arms, Response Time < 2 sec / 250Apeak Response Time < 10 usec		
AC Voltage High / Low Limit	Range	0.0 - 277.0V	
	Resolution	0.1V / step	
AC Voltage Display	Range	0.0 - 277.0 V	
	Resolution	0.1V / step	
	Accuracy	± (1.5% of reading + 2 counts) , 30.0 - 277.0VAC	
Delay time setting	Range	0.5 - 999.9s for AC + DC; 1.8 - 999.9s for AC / DC only Auto range; 1.3 - 999.9s for AC / DC only Fixed range	
	Resolution	0.1s	
Dwell time setting	Range	0, 0.5 - 999.9s for AC + DC, (0 = continuous); 0, 0.1 - 999.9s for AC / DC only, (0 = continuous)	
	Resolution	0.1s	
Timer display	Range	0.0 - 999.9s	
	Resolution	0.1s	
	Accuracy	± (0.1% of reading + 0.05 sec)	
GENERAL			

PLC Remote Control	Input : Test, Reset, Interlock, Recall File 1 through10 Output : Pass, Fail, Test - in - Process, Start - Out, Reset - Out
Scanner Control	It is applied to control Matrix Scanner (Model 7006)
Memory	40 memories, 30 steps / memory Max. Result Display 900 data (30 memories x 30 steps)
Auto Reverse Function	AUTO Reverse ON / OFF parameter setting selection Automatic Reverse polarity switch for normal condition in one step setting menu Only display maximum leakage current value
Scope Output Interface	At rear panel BNC type to connet scope for some IEC standards test requirement and application
Display	320 x 240 graphic LCD
LCD Contrast Setting	Range : 1 - 9; 1 is lightest character, 9 is darkest character
Alarm Volume Setting	Range : 0 - 9; 0 = OFF, 1 is softest volume, 9 is loudest volume
Security	Lockout capability to avoid unauthorized access to test set - up programs
Calibration	Software and adjustments are made through front panel. Automatic Calibration alert function to signal operator when calibration is due
Results Display	All test result information will be displayed on the screen
Interface	USB & RS232 standard / GPIB option
Dimension (W x H x D), mm	430 x 133 x 300
Weight	12Kg
STANDARD ACCESSORIES	
Power Cord (10A)	× 1
Fuses	× 2 (Including a spare contained in the fuse holder)
Interlock Disable Key (1505)	× 1
Hipot Return Lead, 1.8m (1102)	× 2
Dut Power Cable 40A, 1.5m (1148)	× 1
Dut Input Power Lead 40A, 3m (1151)	× 1
USB Link Cable, 1.8m	× 1
RUN Test Function	
W	Range : 0 - 1KW / 1 - 10KW, Resolution : 0.1W / 1W

A	Range : 0.000 - 3.500A / 3.00 - 40.00A, Resolution : 0.001A/ 0.01A	
PF	0.000 -1.000	
Leakage Current	Range : 0.00 - 10.00mA, Resolution : 0.01mA	
AC Current High / Low Limit Setting	Range	0 - 40A
	Resolution	0.01A / step
AC Current Display	Range	0.000 - 3.500A / 3.00 - 40.00A
	Resolution	0.001A / 0.01A
	Accuracy	± (2% of reading + 5 counts) / ± (2% of reading + 2 counts)
AC Power High / Low Limit Setting	Range	0 - 10KW
	Resolution	1W
AC Power Display	Range	0.0 - 1000.0W / 1000 - 10000W
	Resolution	0.1W / 1W
	Accuracy	± (5% of reading + 9 counts)
Power Factor High / Low Limit Setting	Range	0.000 - 1.000
	Resolution	0.001
Power Factor Display	Range	0.000 - 1.000
	Resolution	0.001
	Accuracy	± (8% of reading + 2 counts), V > 60VAC & PF > 0.2
Leakage Current High/Low Limit Setting	Range	0.00 - 10.00mA
	Resolution	0.01mA
Leakage Current Display	Range	0.00 - 10.00mA
	Resolution	0.01mA
	Accuracy	± (2% of reading + 2 counts)
Delay Timer Setting	Range	0.5 - 999.9s
	Resolution	0.1s
Dwell Timer Setting	Range	0, 0.1 - 999.9s (0 = Continuous)
	Resolution	0.1s
Timer display	Range	0.0 - 999.9s
	Resolution	0.1s
	Accuracy	± (0.1% of reading + 0.05s)
Power Control	It is applied to control Transformer Box (1931 / 1931S) or AC Power Source(6700 / 6800 / 6400 Series)	
Opt. 760 HV & GB Link Module		
Max. ACW 5kVAC, DCW 6kVDC & Max. Ground Bond 40A		
Opt. 754 High Measurement Range 35mArms / 75mApeak		
Current accuracy and resolution are same as standard current range .		
Only support 4 MD below :		

MD1	IEC60990 Fig4 U2, IEC 60950 - 1, IEC60335-1, IEC60598 - 1, IEC60065, IEC61010
	IEC60990 Fig4 U1
MD2	IEC60990 Fig5 U3, IEC60598-1
	IEC60990 Fig5 U1
MD3	IEC 60601 - 1
MD5	UL544NP, UL484 , UL923, UL471, UL867, UL697

If the opt.754 function is enabled, the MD module MD4, MD6 & MD7 will be disabled.

*1. If the final measured signal is >range 5 then the maximum composite signal that can be measure is 28 volts peak. If the final measured signal is ≤ range 5 then the maximum composite signal that can be measure is 12 volts peak.
*2. AC cutoff frequency for High Pass Filter is 15Hz on AC only mode
*3. AC cutoff frequency for Low Pass Filter is 15Hz on DC only mode

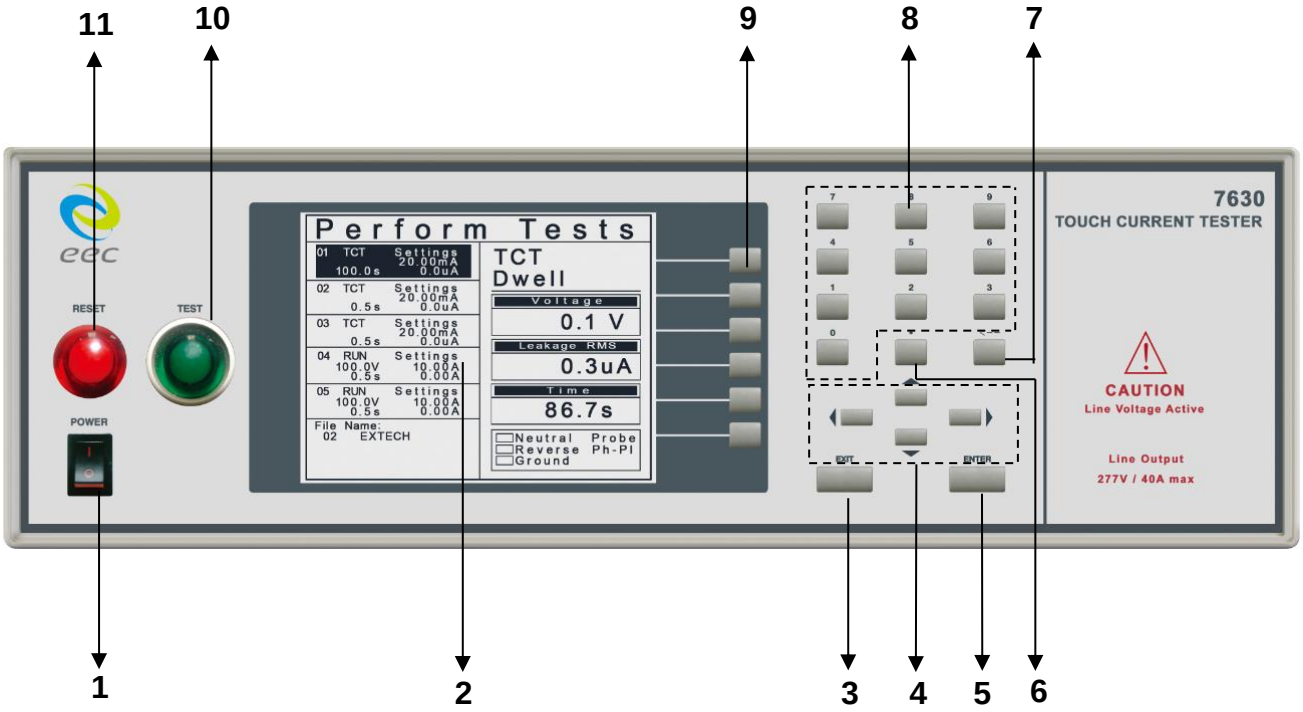
【Ordering Information】

7630 Touch Current Tester
Opt.109 Replace RS232 Interface by GPIB Interface Card
Opt.754 High Measurement Range 35mArms / 75mApeak & 4MDs
Opt.760 HV (5KVac / 6.0KVdc) & GB(40A) Link Module w / o TUV
Opt.766 AC / DC / AC + DC Touch Current Measurement
Opt.789 MD Module (5MDs)JIS C9250, UL544NP, UL1563

Option for External MD
Opt.7020 MD 1k ohm(non-inductive resistor)
Opt.7021 MD NFPA99 Figure A.8.4.1.3.3
Opt.7022 MD IEC60974
Opt.7023 MD IEC60598-1
Opt.7024 MD NFPA99 Figure A.4.3.3.1.3b
Opt.7025 MD NFPA99 Figure A.4.3.3.1.3a
Opt.7027 MD 2k ohm(non-inductive resistor)

7006 Matrix Scanner

3.2 Front Panel Controls



1. POWER SWITCH

Rocker style power switch with international ON (|) and OFF (0) markings.

2. GRAPHIC LCD

320 X 240 Monographic LCD.

3. EXIT KEY

Key used to escape from parameter editing and returning to prior screens.

4. CURSOR KEY

Keys used to scroll the highlighted area or cursor, up and down, left and right. When more than 5 steps are programmed in a test file, the left and right arrow keys will page through the screens of steps. The screens where the paging function is available are as follows: Setup Tests, Perform Tests, Results Summary, and Results

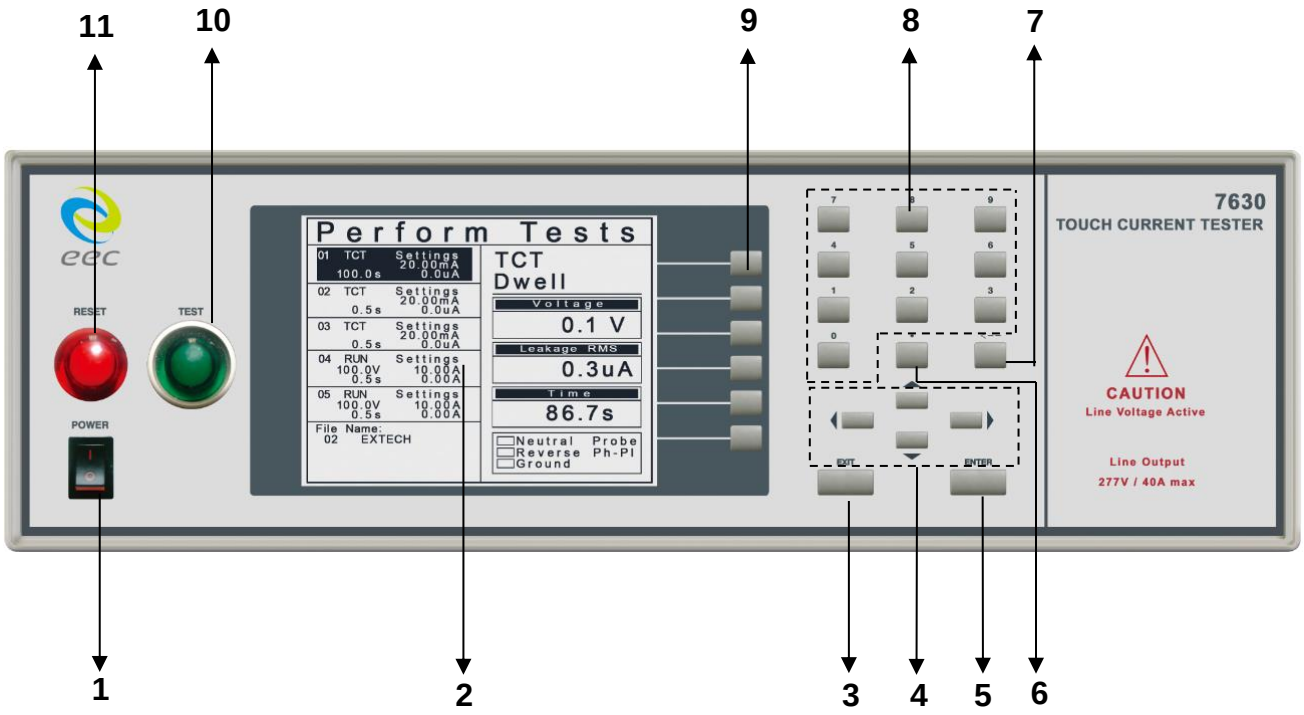
5. ENTER KEY

Key used to finalize parameter entries. The ENTER key may also be used to scroll the highlighted area to different parameters in the parameter-setting screens.

6. . KEY

Key used to key-in decimals.

Front Panel Controls (Continuing)



7. ← KEY

Key used to delete key-in data or recover data.

8. NUMERIC DATA ENTRY

Keys used to enter numeric data.

9. SOFT KEYS

Multifunction parameter selection keys. Keys used to select screens and change parameters.

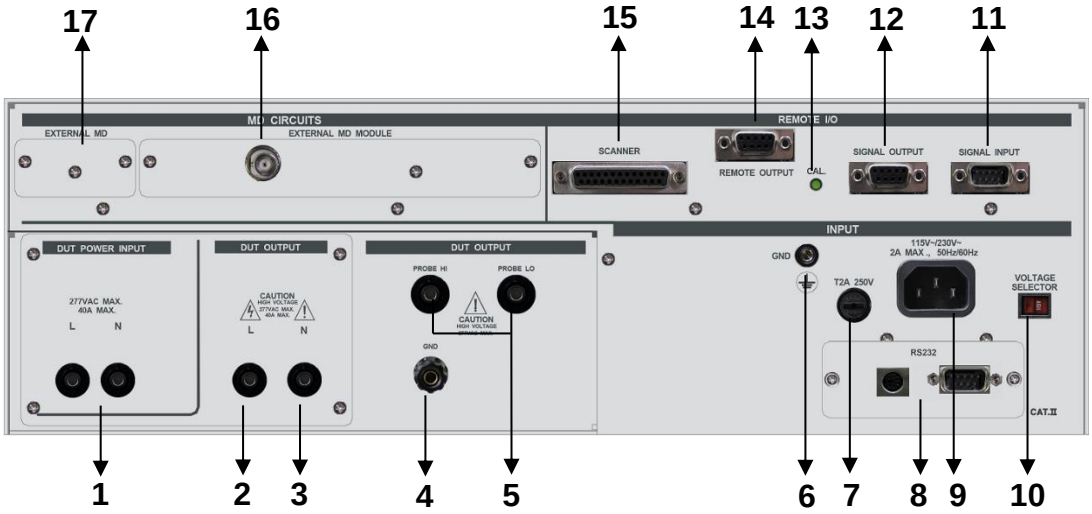
10. TEST BUTTON

Momentary contact switch used to start tests. Press the green button to activate the test that is set up in the test buffer shown on the display.

11. RESET BUTTON

Momentary contact switch used to reset the instrument. If a failure condition occurs during a test, you will need to reset the system to shut off the alarm and signal the system that you are aware of a failure condition. The reset button must be pressed before you can proceed to the next test or change any of the set-up parameters. This switch also serves as an abort signal to stop any test in progress controlled by the 7630.

3.3 Rear Panel Controls



1. DUT POWER INPUT CONNECTOR

This connector provides the Line and Neutral input power connections on pin 1 and 2 respectively. An external single phase unbalanced AC power supply with a single Hot or Line conductor should be connected here, to supply power to the DUT while performing the leakage test. This input is rated for 0-277 volts 50/60 Hz.

2. L TERMINAL

This output terminal is where the LINE power connection from the adapter box is plugged into the run test or Touch Current test. Line power is supplied to the DUT during the run test or Touch Current test through this terminal and High Voltage is supplied to the DUT through this terminal during the Dielectric Withstand or Insulation Resistance. This terminal and the "N" Terminal are shorted together when Dielectric Withstand or Insulation Resistance are being performed.

3. N TERMINAL

This output terminal is where the NEUTRAL power connection from the adapter box is plugged into the run test or Touch Current test. Line power is supplied to the DUT during the run test or Touch Current test through this terminal and High Voltage is supplied to the DUT through this terminal during the Dielectric Withstand or Insulation Resistance. This terminal and the "L" Terminal are shorted together when Dielectric Withstand or Insulation Resistance are being performed.

4. GND TERMINAL

This terminal is where the Ground or Earth terminal from the adapter box is connected.

5. PROBE HI / PROBE LO

Probe HI terminal is an input to one side of the MD(measuring device) and will be enabled during a Touch Current test when ever Probe-HI has been selected at setup. This terminal is provided for performing Enclosure leakage or Applied Part leakage tests. When run tests and Touch Current

tests are not being performed, this terminal is isolated from the run test and Touch Current test circuits.

Probe LO terminal is an input to one side of the MD(measuring device) and will be enabled during a Touch Current test when ever Probe-LO has been selected at setup. This terminal is provided for performing Applied Part leakage tests and is always used in conjunction with the Probe-HI terminal. When run tests and Touch Current tests are not being performed, this terminal is isolated from the run test and Touch Current test circuits.

6. CHASSIS GROUND (EARTH) TERMINAL

This terminal should be connected to a good earth ground before operation.

7. FUSE RECEPTACLE

To change the fuse, unplug the power (mains) cord and turn the fuse receptacle counter-clockwise. The fuse compartment will be exposed. Please replace the fuse with one of the proper rating.

8. INTERFACE

Standard connector for interconnection to the RS-232 Bus interface. Optional IEEE 488 interface or Opt.751 Multi-function Interface Card may be substituted for the RS-232. Multi-function interface card including USB port A type, combination of RS-232, RS-485 port, and Bar Code Input with internal memory capability.

9. INPUT POWER RECEPTACLE

Standard IEC 320 connector for connection to a standard NEMA style line power (mains) cord.

10. INPUT POWER SWITCH

Line voltage selection is set by the position of the switch. In the up position it is set for 115 volt operation, in the down position it is set for 230 volt operation.

11. REMOTE SIGNAL INPUT

9-Pin D subminiature male connector for remote control of test, reset, and interlock functions, as well as remote program file selection.

12. REMOTE SIGNAL OUTPUT

9-Pin D sub-miniature female connector for monitoring PASS, FAIL, and PROCESSING output relay signals.

13. CALIBRATION BUTTON

To put the instrument into the calibration mode, push this button and turn on the power switch simultaneously.

14. POWER CONTROL BUS

This is only for RUN Test Function. The power source must be connected to this Connector, then it can supply power to DUT.

15. SCANNER OUTPUT

This is an I/O signal control bus. There are 7 signals are provided by seven normally open internal relays. They can to used to control the HI/LO signals of Probe HI and Probe LO of DUT by Scanner.

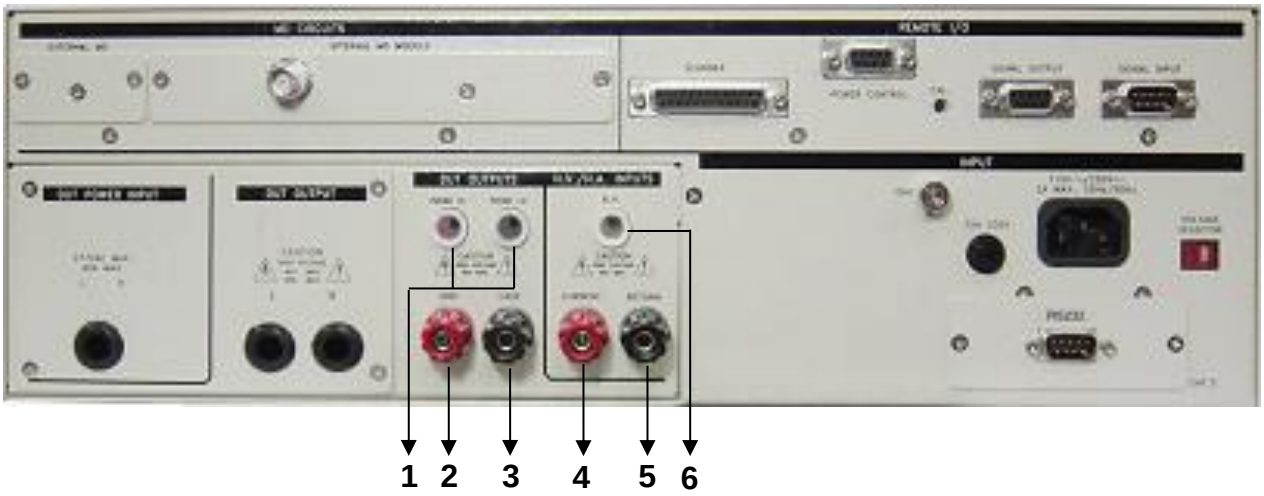
16. MD OUTPUT SIGNAL TERMINAL

With external voltage meter or oscillograph it is convenient for verifying the circuit of MD. Optional OPT.754 High Measurement Range 35mArms / 70mApeak & 4MDS may be substituted for built-in 7 kinds of common measuring devices。

17. EXTERNAL MEASURING DEVICE

This compartment contains an external Measuring Device PCB. This device will enable during a Touch Current test when the “External” is selected from the Meas. Device soft key. The external measuring device allows the operator to test to a standard that calls for a custom measuring device or easily change the measuring device if the standard requirements change. The instrument is provided with a 1k ohm resistor on the measuring device PCB. The PCB can easily be reconfigured for a simple resistive component or a complex two-pole measuring device.

3.4 OPT.754 HV & GB Link Module



1. PROBE HI / PROBE LO

Probe HI terminal is an input to one side of the MD(measuring device) and will be enabled during a Touch Current test when ever Probe-HI has been selected at setup. This terminal is provided for performing Enclosure leakage or Applied Part leakage tests. When run tests and Touch Current tests are not being performed, this terminal is isolated from the run test and Touch Current test circuits.

Probe LO terminal is an input to one side of the MD(measuring device) and will be enabled during a Touch Current test when ever Probe-LO has been selected at setup. This terminal is provided for performing Applied Part leakage tests and is always used in conjunction with the Probe-HI terminal. When run tests and Touch Current tests are not being performed, this terminal is isolated from the run test and Touch Current test circuits.

2. GND TERMINAL

This terminal is where the Ground or Earth terminal from the adapter box is connected.

3. CASE TERMINAL

This terminal is connected to the DUT case or dead metal and provides the return for the Ground Bond, Dielectric Withstand, and Insulation Resistance tests. During a Run test or Touch Current test, this terminal is isolated from the test circuits.

4. CURRENT OUTPUT JACK

Connector used to attach the high current output lead, adapter box high current lead or test fixture high current lead to the instrument. This connection provides the output current for the ground bond and continuity.

5. RETURN OUTPUT JACK

Connector used to attach the Return test lead, or test fixture return lead to the instrument. This connection provides the return current path for the high voltage, ground bond and continuity current.

6. HIGH VOLTAGE OUTPUT JACK

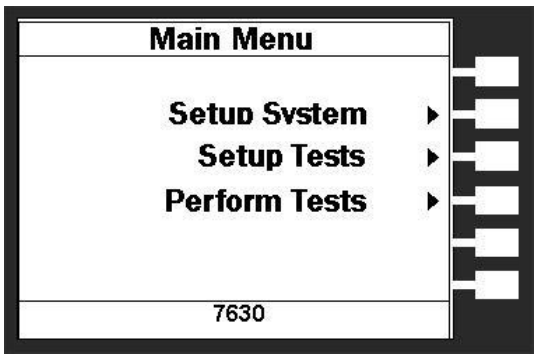
Connector used to attach the High Voltage test lead, adapter box high voltage lead, or test fixture high voltage lead to the instrument. The connector is recessed for safety when not being used.

4. Description of Setting

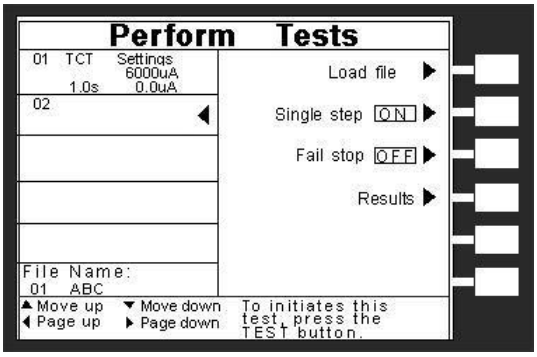
Turn on the POWER switch located on the lower left-hand side of the front panel.

If any of the parameters at the Power-On Screens have been altered from their original settings, the sequence of initialization screens may not follow suite with what was described in the previous paragraph. Please refer to the section **4.1 Setup System Menu** for a description of the Power-On Screen parameters.

After pressing any key, the Main Menus screen will be displayed. The Main Menu screen will appear as follows:



At the Main Menu screen, press the “Perform Tests” soft key. The Perform Tests screen will now be displayed. The Perform Test screen will appear as follows:



The 7630 comes pre-loaded with one default test file , and the left side of the display shows the pre-loaded program step and the parameters stored with in it. If this test is unacceptable for your DUT then refer to the section **4.5 Setting Up a Test**, for instructions on how to program tests into the instrument.

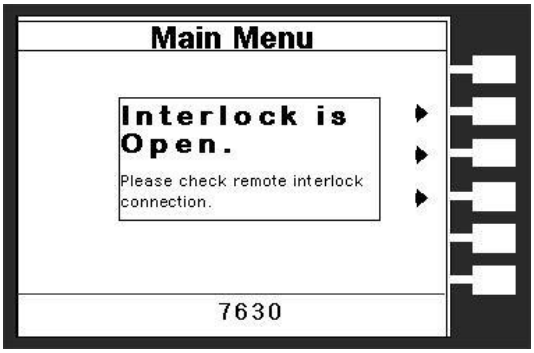
If these test file parameters are acceptable then connect an appropriate set of test leads to the device under test (DUT) or test fixture. Make sure the safety ground of this instrument is connected to a known good ground.

Refer to section **4.1.3 Hardware**, Smart GFI, for an explanation of DUT grounding configurations.

WARNING **DO NOT TOUCH THE DEVICE UNDER TEST ONCE THE TEST HAS BEEN STARTED.**

Remote Interlock

7630 is equipped with a featured referred to as “Remote Interlock”. Remote Interlock is a feature that utilizes a set of closed contacts to enable the instruments output. In other words, if the Interlock contacts open, the output of the instrument will be disabled. Remote Interlock could also be referred to as a remote system lockout, utilizing “Fail When Open” logic. If the Interlock contacts are open and the Test button is pushed, a pop-up message will be displayed on the screen for two seconds. The message will appear as follows:

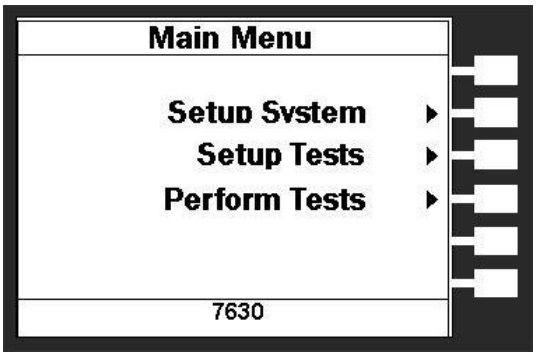


If the Interlock contacts are opened during a test, the pop-up message will be displayed and the test will abort. The hardware and has been configured to provide the interlock connections on pins 4 and 5 of the Remote Interface, Signal Input port. The instrument can still be used without the external interlock device as long as the Interlock Connector (1505 provided with unit) is plugged into the Remote Interface, Signal Input port. If there is nothing connected to the Remote Interface, Signal Input port to provide a connection to the interlock, the instrument will not perform tests.

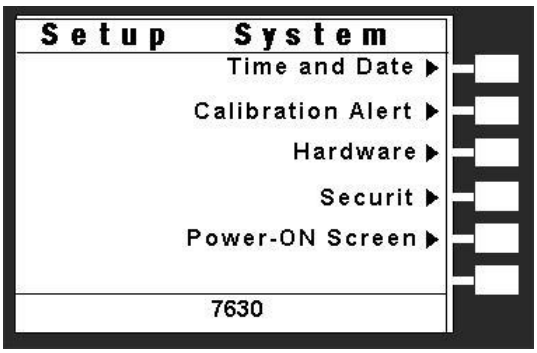
Please check your connections to be sure they are making good contact. Clear the area of any debris that may create a hazardous situation and ask any unnecessary personnel to leave the area. To initiate the test, press the GREEN test button on the front panel. This is a momentary button and does not need to be held in the pressed position during the test. The instrument will then initiate the test presently loaded from the selected default file.

4.1 Setup System Menu

From the Main Menu screen, press the “Setup System” soft key, the Setup System Menu will now be displayed.

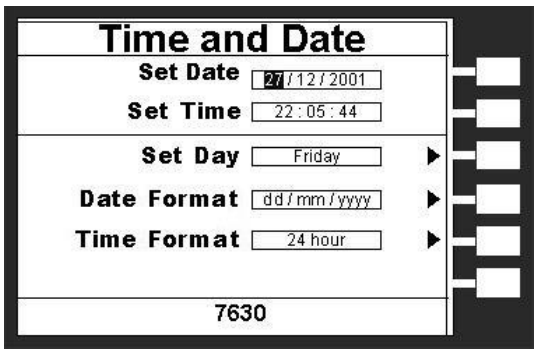


From the Setup System screen, six different Hardware and Software controls may be accessed; Time and Date, Calibration Alert, Hardware, Security, and Power On Screens. Pressing the EXIT key at any time will return you to the Main Menu. The Setup System screen will appear as follows:



4.1.1 Time and Date

From the System Setup screen, press the “Time and Date” soft key. The Time and Date setting screen will now be displayed**.** From the Time and Date setting screen, five different parameters may be accessed, Set Date, Set Time, Set Day, Date Format and Time Format. The Time and Date Setting screen will appear as follows:



4.1.1.1 Set Date

From the Time and Date setting screen, highlight the Set Date parameter by using the up and down arrow keys. The up and down arrow keys will toggle the highlighted area of the screen

between the Set Date and Set Time.
Within the Set Date parameter are three separate fields, month, day, and year. Using the left and right arrow keys select the field within the date, you want to edit. Using the numeric keypad enter the new number. Once you begin typing a new number, the parameter will blank and the cursor will begin blinking. This indicates that the parameter is being edited. Once a parameter is edited, it is necessary to complete the edit either by pressing the ENTER key to accept the new number or the EXIT key to escape from the edit and return to the original number.

4.1.1.2 Set Time

From the Time and Date setting screen, highlight the Set Time parameter by using the up or down arrow keys. The up and down arrow keys will toggle the highlighted area of the screen between the Set Date and Set Time.

Within the Set Time parameter are three separate fields, hours, minutes, and seconds. The time must be set using 24-hour Military time. Using the left and right arrow keys to select the field within the time parameter you want to edit. Using the numeric keypad enter the new number. Once you begin typing a new number, the parameter will blank and the cursor will begin blinking. This indicates that the parameter is being edited. Once a parameter is edited, it is necessary to complete the edit either by pressing the ENTER key to accept the new number or the EXIT key to escape from the edit and return to the original number.

4.1.1.3 Set Day

From the Time and Date setting Screen, press the “Set Day” soft key. As the soft key is pressed, the day format will toggle from Sunday to Saturday.

4.1.1.4 Date Format

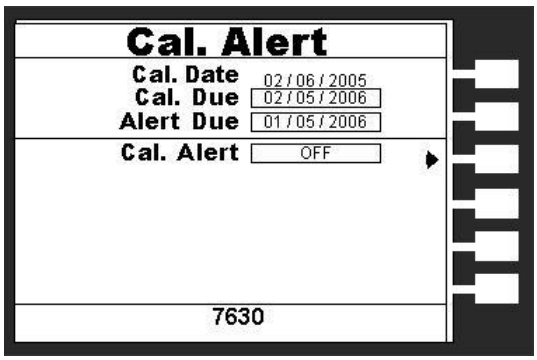
From the Time and Date setting Screen, press the “Date Format” soft key. As the soft key is pressed, the displayed date will toggle between two different date formats, yyyy/mm/dd or mm/dd/yyyy.

4.1.1.5 Time Format

From the Time and Date setting Screen, press the “Time Format” soft key. As the soft key is pressed, the time format will toggle between 12 hour and 24 hour modes. Although the time format may be set to either 12 or 24-hour modes, the time must still be set using 24-hour Military time.

4.1.2 Calibration Alert

Calibration Alert is a feature that will allow the instrument to give an advanced alert that the calibration for the instrument is coming due. From the System Setup screen, press the “Calibration Alert” soft key. The Cal. Alert setting screen will now be displayed.



From the Cal. Alert setting screen, three different parameters may be accessed1, Cal Due, Alert Date, Cal. Alert. The Cal. Alert setting screen also displays the date of the last performed calibration. The Cal. Alert setting screen will appear as follows:

4.1.2.1 Calibration Due Date

It is recommended that calibration should be performed at least once a year. It is recommended that the Calibration Due date not bet set greater than one year from the Cal. Date displayed.

From the Cal. Alert setting screen, highlight the Cal. Due parameter by using the up or down arrow keys. The up and down arrow keys will toggle the highlighted area of the screen between the Cal Due and Alert Date.

Using the left and right arrow keys and the numeric keypad enter the Calibration Due date. Press the ENTER key to finish.

4.1.2.2 Alert Date

The Alert date is like an alarm clock that will warn you in advance of the actual calibration due date. After a calibration is performed, the Alert Date is automatically set 11 months after the calibration date. For example, if the calibration is performed on 12/15/2001 the Alert Date will automatically be set to 11/15/2002. Although this date is automatically written into the Alert Date location, it may be manually overwritten to any advanced date desired.

At the Cal. Alert setting screen, highlight the Alert Date parameter by using the up or down arrow keys. The up and down arrow keys will toggle the highlighted area of the screen between the Cal Due and Alert Date.

Within the Alert Date parameter are three separate fields, month, day, and year. Using the left and right arrow keys select the field within the date, you want to edit. Using the numeric keypad enter the new number. Once you begin typing a new number, the parameter will blank and the cursor will begin blinking. This indicates that the parameter is being edited. Once a parameter is edited, it is necessary to complete the edit either by pressing the ENTER key to accept the new number or the EXIT key to escape from the edit and return to the original number.

At the Calibration Alert Warning screen there are three options, “Show this screen again?”, Password and OK. “Show this screen again?” is asking if you would like to continue seeing the Calibration Alert Warning screen every time you power up the instrument. You may turn this screen “OFF” by toggling to the word “No” using the soft key next to this parameter. If the instrument is password protected you will need to enter the password in order to turn off the “Show this screen again” parameter. Selecting the “Show this screen again” parameter “OFF” will disable the Calibration Alert function. Pressing the OK soft key will exit the Calibration Alert Warning screen and go to the standard introduction screen.

4.1.2.3 Calibration Alert On/Off

From the Cal. Alert setting screen, you may turn the Calibration Alert function ON and OFF by pressing the “Cal. Alert” soft key. If the “Show this screen again?” function has been turned “OFF” at the Calibration Alert Warning screen, this parameter will automatically be set to “OFF”. Turning this parameter “ON” will activate the Cal Alert function and when the date matches the Alert Date, the instrument will display the Calibration Alert warning screen upon power up.

4.1.3 Hardware

From the System Setup screen, press the “Hardware” soft key. The Hardware setting screen will now be displayed. From the Hardware setting screen, five different parameters may be accessed: Alarm Volume, LCD Contrast, GPIB Address (Option GPIB Function) , and PLC Remote.

4.1.3.1 Alarm Volume

From the Hardware setting screen, highlight the Alarm Volume parameter by using the up or down arrow keys. The up and down arrow keys will toggle the highlighted area of the screen between the Alarm Volume, LCD Contrast, PLC Remote and GPIB Address.

Use the numeric keypad to set the Volume of the alarm in the instrument. Enter a number between 0 and 9, 0 being the volume is off and 9 being the loudest setting. After the number is entered, a momentary alarm chirp will occur to indicate the volume of the new setting.

4.1.3.2 LCD Contrast

From the Hardware setting screen, highlight the LCD Contrast parameter by using the up or down arrow keys. The up and down arrow keys will toggle the highlighted area of the screen between the Alarm Volume, LCD Contrast, PLC Remote and GPIB Address.

Using the up and down arrow keys and the numeric keypad set the Contrast of the display. Enter a number between 0 and 9, 0 being the lightest color of displayed characters and 9 being the darkest color of displayed characters. After the number is entered, the display will automatically adjust to the new display setting.

4.1.3.3 GPIB Address (Option)

From the Hardware setting screen, highlight the GPIB Address parameter by using the up or down arrow keys. The up and down arrow keys will toggle the highlighted area of the screen between the Alarm Volume, LCD Contrast, PLC Remote and GPIB Address.

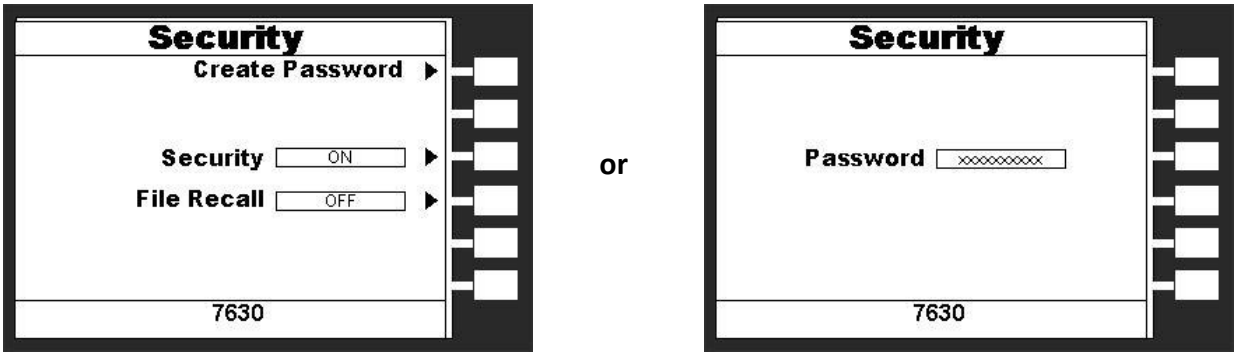
Use the numeric keypad to select the GPIB Address number between 0 and 30. Finish by pressing the ENTER key.

4.1.3.4 PLC Remote

From the Hardware setting screen, you may turn the PLC remote ON and OFF by pressing the "PLC Remote" soft key. Refer to the section **6. Connection of Remote I/O** for details.
If you attempt to start a test from the front panel Test button and the PLC remote function is turned "ON", a pop-up message will be displayed. The pop-up message will appear as follows:

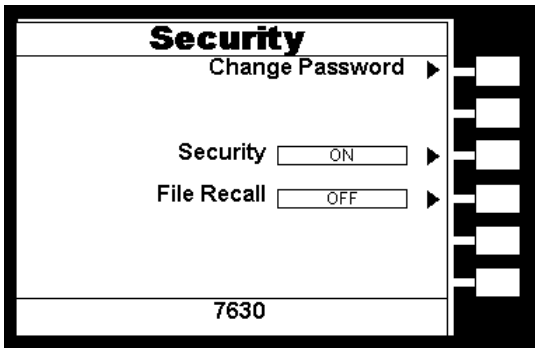
4.1.4 Security

From the System Setup screen, press the "Security" soft key. One of two possible Security screens will be displayed. The Security screens appear as follows:



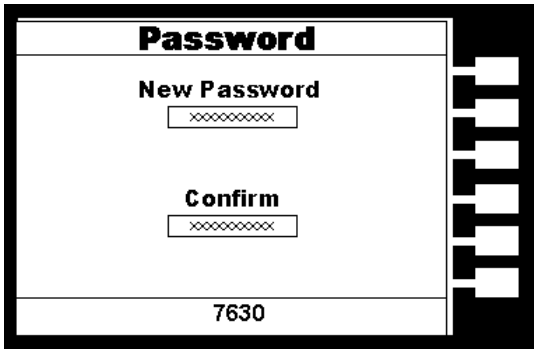
Initially, the instrument will not have a password enabled and the Security setting screen will appear (screen on the left, refer to the above illustrations). You may create a password from this screen so that all security functions will require a password to access. From the Security settings screen, three different parameters may be accessed, Create Password, Security and File Recall.

If a password has already been created then the Security password screen (screen on the right) will appear and typing in the correct password will be required to access the Security setting screen. From the password protected Security settings screen, three different parameters may be accessed, Change Password, Security and File Recall. The Security setting screen that will appear after a password has been created and entered correctly, will appear as follows:



4.1.4.1 Create Password

From the initial Security setting screen, you may create a password by pressing the “Create Password” soft key. Press the “Create Password” soft key, the Password setting screen will now be displayed. The Password setting screen will appear as follows:



You may now type in the new password using the numeric keypad, press the Enter key to accept the new password or press the exit key to escape. After you type in your new password, you will be required to confirm your new password by typing it again into the “Confirm Password” field. Press the Enter key to confirm the new password or press the EXIT key to escape.

Change Password

From the Security setting screen, you may change the security password by pressing the “Change Password” soft key. Once you press the “Change Password” soft key the Password setting screen will appear.

4.1.4.2 Security

From the Security setting screen, you may turn the Security function ON and OFF by pressing the “Security” soft key. Selecting security “ON” restricts access to parameter settings. The level of security is determined by the File Recall function.

Whenever security is selected “ON”, Single Step and Fail Stop soft keys will be disabled at the Perform Test screen.
Whenever security is enabled, you may only start at Test file at Test step 1.

4.1.4.3 File Recall

File Recall is a sub-function of the security setting. In order for the File Recall function to work, the Security must first be turned “ON”. From the Security setting screen, you may turn the File Recall function ON and OFF by pressing the “File Recall” soft key. Selecting the File Recall “ON” will allow the user to access all available test files but still restricts access to file editing capability. Selecting the file recall “OFF” will allow the user to only run the currently loaded test file.

Disabling the password

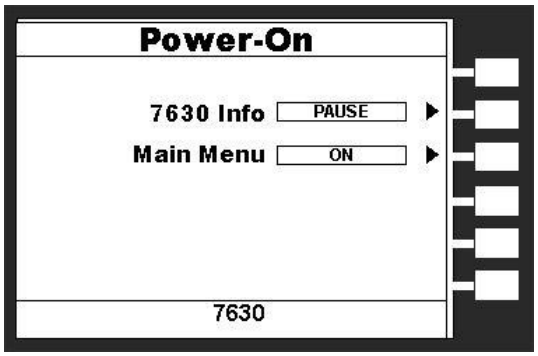
To disable the password simply change the password to “0”. After the password is reset to “0” all security functions may be access without the use of a password.

Forgotten Password

If you have forgotten your password you may access all security functions by typing in the number “8000” into the password field. The old password can not be recovered. A new password should be entered or enter “0” to disable the password.

4.1.5 Power-On Screen

The Power-On screen allows you to select the screen(s) that will be displayed when the instrument is first powered up. From the System Setup screen, press the “Power-On Screens” soft key. The Power-On screen will now be displayed. The Power-On screen will appear as follows:



From the Power-On screen, two different parameters may be accessed, 7630 Info and Main Menu.

4.1.5.1 7630 Info

The 7630 Information screen is the very first screen to appear when the instrument is powered up. You have the option to PAUSE the instrument at this screen after power up or CONTINUE through to the next screen after the Information screen is displayed for four seconds. The option to PAUSE or CONTINUE may be selected by pressing the 7630 Info soft key. When PAUSE is selected the words “Press any key to continue“ will appear at the bottom of the 7630 Information screen.

4.1.5.2 Main Menu

When the Main Menu parameter is ON, the first display to appear after the 7630 Information screen is the Main Menu. When the Main Menu parameter is OFF the first display to appear

after the 7630 Information screen is the Perform Test screen.

Configure 7630 to go Directly to the Perform Test screen

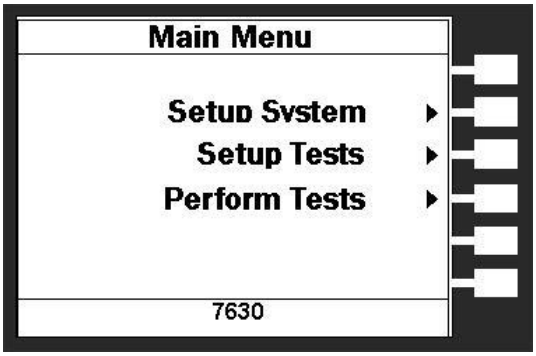
Set 7630 Info to CONTINUE, and set the Main Menu selection to OFF. Now when the instrument is powered on it will go directly to the Perform Test screen.

GPIB Interface

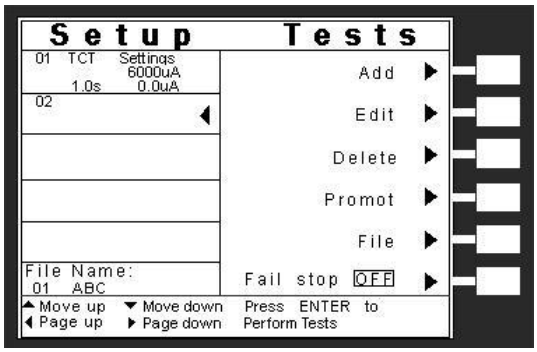
This option may be substituted for the RS232 interface. This option provides all of the function control of the RS232 interface with the addition of SRQ functions. All commands can be found in section **6.2 Bus Remote Interface GPIB/RS-232** of this manual.

4.2 Setup Tests Menu

From the Main Menu screen, press the soft key “Setup Tests”.



The Setup Tests Menu will now be displayed. From the Setup Tests screen, six different software controls may be accessed: Add, Edit, Delete, Prompt, File, and Fail Stop. The Setup Tests screen will appear as follows:

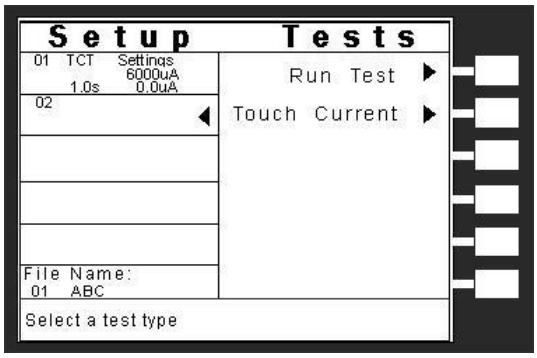


The Setup Tests screen is the central starting point for programming tests into the instrument. From this screen, test parameters are entered and edited, and the order of the test steps are arranged and then stored to test files. The 7630 is capable of performing a 30 step sequential test from a single test file.

The Setup Tests screen is separated into two main sections. The left half of the screen lists the steps and the parameters contained within each step. The right half of the screen contains the soft key menu. When more than 5 steps are programmed in a test file, the left and right arrow keys will page through the screens of steps. Individual steps may be scrolled to using the up and down arrow keys.

4.2.1 Add

From the Setup Tests screen, press the “Add” soft key. The Setup Tests, Test selection screen will now be displayed. From the this screen you may select what type of test you wish to add to a test sequence, Touch Current, Run Test(option). The Test selection screen will appear as follows:



For a detailed description of how to set up a test sequence, please refer to section **4.4 Setting Up a Test.**

For a detailed description of the screens and parameters that are associated with Test selection softkeys on this screen please refer to section **4.4 Test Parameters.**

4.2.2 Edit

From the Setup Tests screen, use the up, down arrow keys, and scroll the highlighted area to the step you wish to edit. Press the “Edit” soft key. The Parameter-setting screen, for the type of test that is in that location will now be displayed. The parameters for the test may now be edited.

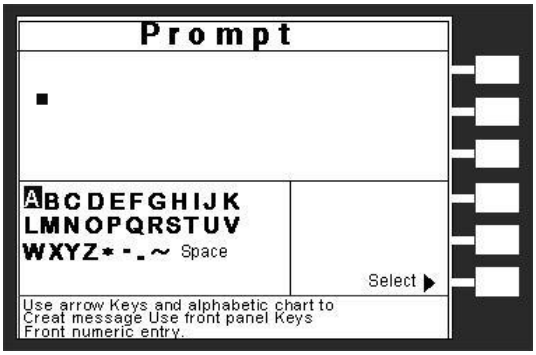
For a detailed description of the screens and parameters that are associated with the Edit softkey on this screen please refer to section **4.4 Test Parameters.**

4.2.3 Delete

From the Setup Tests screen, use the up, down arrow keys, and scroll the highlighted area to the step you wish to delete. Pressing the “Delete” soft key will remove the step.

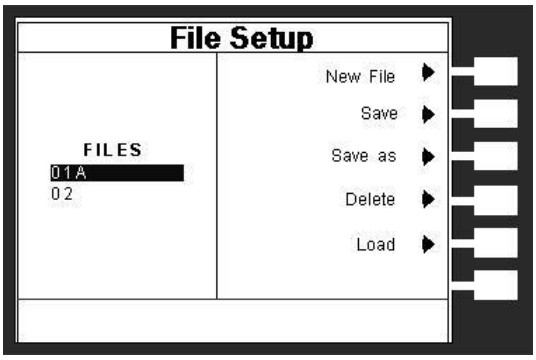
4.2.4 Prompt

The prompt function allows you to insert a short line of text in a step. The prompt will appear on the screen before the step is initiated and remain on the screen until the TEST button is pressed. After the TEST button is pressed, the Prompt will clear and the step will initialize. Use the up, down arrow keys to scroll the highlighted area to the step where you would like to insert the text prompt and press the “Prompt” soft key. The Prompt screen will now be displayed. The Prompt screen will appear as follows:



4.2.5 File

From the Setup Tests screen, press the “File” soft key. The File Setup screen will now be displayed. From the File Setup screen, five different file-handling controls may be accessed: New File, Save, Save As, Delete, and Load. The File Setup screen will appear as follows:



4.2.5.1 New File

From the File Setup screen, press the “New File” soft key. The Create File screen will now be displayed. For a detailed description of creating a new file, refer to the section **4.4 Setting Up a Test**. The Create File screen will appear as follows:

4.2.5.2 Save

To save a file with its current name press the “Save” soft key from the File Setup screen.

4.2.5.3 Save As

To save an edited file without overwriting the original or to give a file a new name, press the “Save As” soft key from the File Setup screen. The Create File screen will now be displayed. For a detailed description of creating a new file, refer to the section **4.5 Setting Up a Test**.

4.2.5.4 Delete

To delete a file, use the up, down arrow keys and scroll the highlighted area to the file you wish to delete and press the “Delete” soft key. A warning will appear on the screen asking if you want to delete the file. Press the ENTER key to complete the deletion or press the EXIT key to escape.

4.2.5.5 Load

To load a test file, use the up, down arrow keys and scroll the highlighted area to the file you wish to load and press the “Load” soft key.

4.2.6 Fail Stop

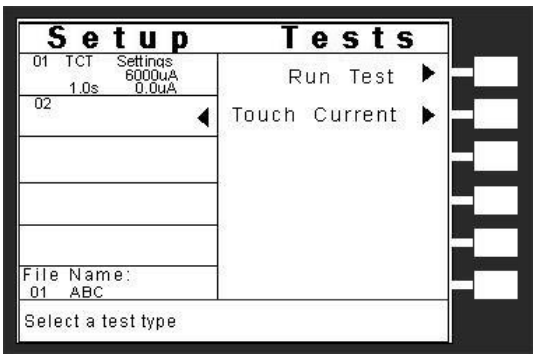
Fail Stop is a function that will stop a sequence of tests at the step if a failure occurs. If this function is turned off, the sequence of tests will continue to the end of the sequence regardless of whether or not a failure has occurred. If the Fail stop is off and a failure occurs during the test sequence, the RESET button will light and a short alarm will sound but the sequence will continue to the end. At the end of the test sequence, the RESET button will light and alarm will sound indicating failure during the sequence. Pressing the RESET button will silence the alarm and reset the instrument. Turn the Fail Stop function ON and OFF by pressing the “Fail Stop” soft key. Fail stop is a parameter that is stored within the test file but may also be turned ON and OFF temporarily from the Perform Tests screen. If security is enabled you may not turn Fail Stop ON and OFF using the “Fail Stop” soft key. Fail Stop automatically defaults to the setting stored in the file when security is activated.

Fail Stop with Run and Touch Current tests

eec recommends performing a Hipot test, with the Fail Stop “ON”, prior to performing a Run Test or Touch Current test. Performing a Hipot test first can detect if a DUT is shorted line to ground before applying line power to it.

4.3 Test Parameters

From the Setup Tests screen, press the “Add” soft key. The Setup Test, Tests Selection screen will now be displayed. From this screen, you may choose what type of test to perform, Touch Current, or RUN Test. If you have OPT.754, you will also have the Run Test selection. The Setup Test, Tests Selection screen will appear as follows:



Test Parameter Notes

Once you begin typing a new number, the parameter will blank and the cursor will begin blinking. This indicates that the parameter is being edited. Once a parameter is edited, it is necessary to complete the edit either by pressing the ENTER key to accept the new number or the EXIT key to escape from the edit and return to the original number. The one exception to this rule is the scanner parameter. The scanner parameter will not blank when being edited.
When the ENTER key is pressed to accept a parameter change the highlighted area of the display will automatically move to the next parameter.

The lower left corner of the Test parameter-setting screen displays the “Range” of the parameter that is highlighted. Use this as a guide when setting your parameters. All softkey functions in the parameter menus toggle between two conditions and no data entry is required i.e. The frequency softkey toggles between 50Hz and 60Hz.

Pressing the “Default” soft key will set all of the test parameters to the preset default parameters. Once the default soft key is pressed, it is necessary to complete the edit either by pressing the ENTER key to accept the parameter overwrite or the EXIT key to escape from the edit and return to the original values. Refer to section 4.4 for the preset default parameters.
When multiple screens of steps are programmed into a file, you may use the left and right arrow keys to scroll through pages of screens.

4.3.1 Description of Test Parameters

Voltage-HI: The maximum voltage allowable at the DUT Power Input Terminal that when exceeded triggers a failure.

Voltage-LO: The minimum voltage allowable at the DUT Power Input Terminal that when not exceeded triggers a failure.

Amp-HI: The maximum allowable current-flow through the DUT that when exceeded triggers a failure.

Amp -LO: The minimum allowable current-flow through the DUT that when not exceeded triggers a failure.

Dwell Time: A length of time that is allowed for all programmed parameters set to be applied.

Delay Time: A length of time needed to ensure the DUT has reached proper operating conditions, during which the HI and LO limit detectors are disabled. The over current judgment is activated at the end of the Delay Time. The instrument will not indicate that an over current limit has been exceeded until the Delay Time period has expired.

Leakage-HI: The maximum leakage current allowable through the measuring device that when exceeded triggers a failure.

Leakage-LO: The minimum leakage current allowable through the measuring device that when not exceeded triggers a failure.

Power-HI: The maximum allowable power consumption by the DUT that when exceeded triggers a failure.

Power-LO: The minimum allowable power consumption by the DUT that when not exceeded triggers a failure.

PF-HI: The maximum allowable Power Factor that when exceeded triggers a failure.

PF-HI: The minimum allowable Power Factor that when not exceeded triggers a failure.

HI-Limit: A maximum threshold set point that when exceeded triggers a failure.

Offset: This function allows the instrument to compensate for leakage current during a touch current test.

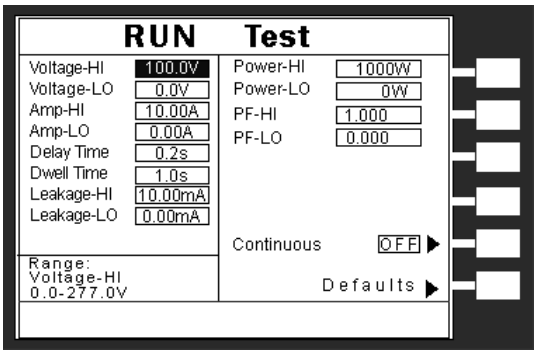
Scanner Setup: (This parameter will only be seen on units equipped with a scanner). This

multiple parameter allows for set up of the scanner channels. The individual scanner channel parameters may be accessed using the arrow keys and the state of the scanner channel may be selected using a softkey labeled “Scanner Channel Output Select”. The three different selectable scanner states are L (scanner channel set to the return point), H (scanner set to the high voltage point) and O (OFF).

Defaults: Pressing this softkey will default all of the test parameters to the predetermined default values. Once the default soft key is pressed, it is necessary to complete the edit either by pressing the ENTER key to accept the parameter overwrite or the EXIT key to escape from the edit and return to the original values.

4.3.2 Run Test

From the Setup Tests, Tests Selection screen, press the “Run Test” soft key. The Run Test parameter-setting screen will now be displayed. The Run test parameter-setting screen will appear as follows:

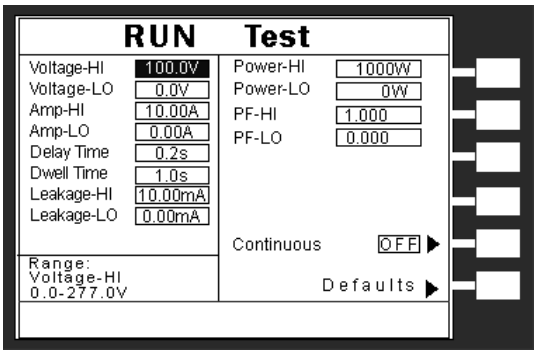


From the Run Test parameter-setting screen, the following parameters may be controlled: Voltage-HI, Voltage-LO, Amp-HI, Amp -LO, Delay Time, Dwell Time, Leakage-HI, Leakage-LO, Power-HI, Power-LO, PF-HI, PF-LO and **Continuous**.

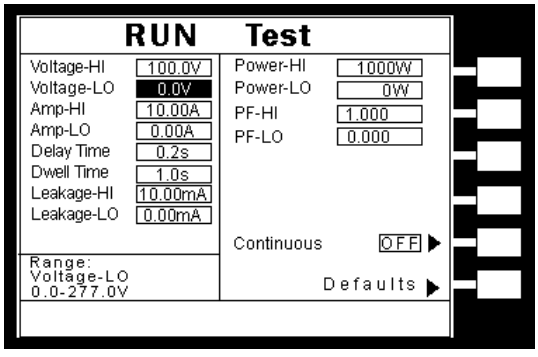
An additional parameter exclusive for DUT input power is Power Control.

4.3.2.1 Voltage Setting (Voltage-HI and Voltage-LO)

Please use the up and down arrow keys or the ENTER key and scroll the highlighted area to the **Voltage-HI** or **Voltage-LO** parameter. The display will appear as follows:



Voltage-HI

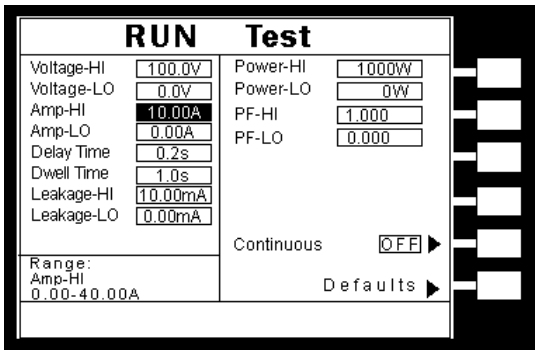


Voltage-LO

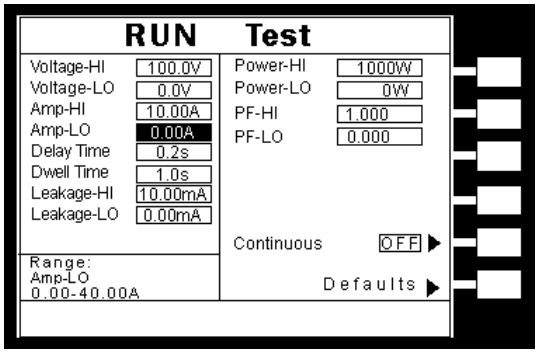
Enter the new voltage via the numeric keypad and then press the ENTER key to accept the new parameter or press the EXIT key to escape from the edit.

4.3.2.2 Current Setting (Amp-HI and Amp-LO)

Please use the up and down arrow keys or the ENTER key and scroll the highlighted area to the **Amp-HI** or **Amp-LO** parameter. The display will appear as follows:



Amp -HI

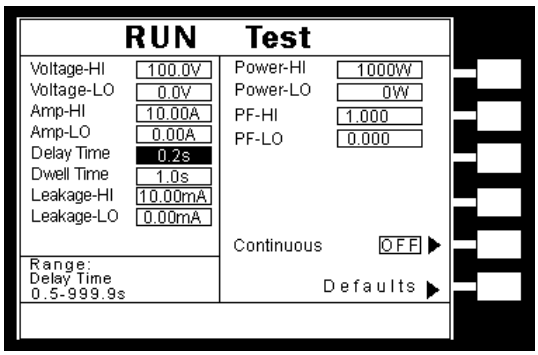


Amp -LO

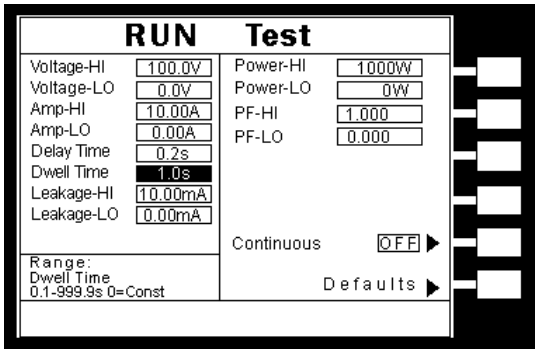
Enter the new current via the numeric keypad and then press the ENTER key to accept the new parameter or press the EXIT key to escape from the edit.

4.3.2.3 Delay Time and Dwell Time setting

Please use the up and down arrow keys or the ENTER key and scroll the highlighted area to the **Delay Time** or **Dwell Time** parameter. The display will appear as follows:



Delay Time



Dwell Time

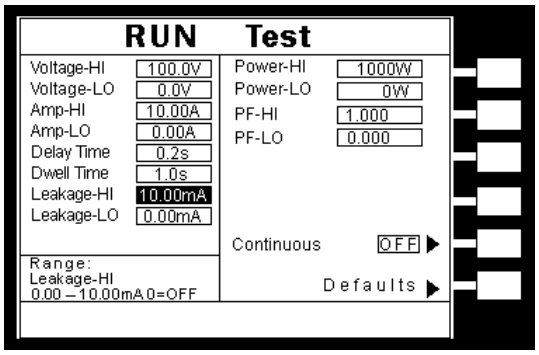
Enter the new time via the numeric keypad and then press the ENTER key to accept the new parameter or press the EXIT key to escape from the edit.

If the dwell time is set to “0”, the instrument will operate in a continuous mode. It will stop when the DUT (Device Under Test) goes into failure or the “RESET” button is pressed. The minimum

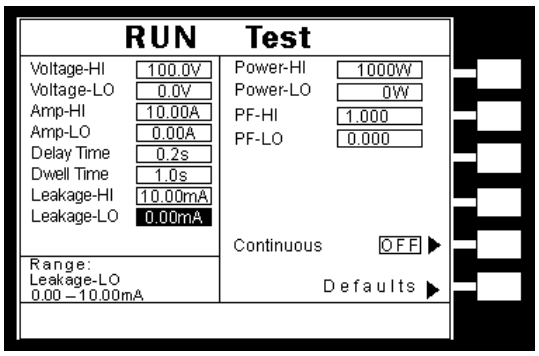
dwell time setting is 0.1 seconds.

4.3.2.4 Leakage Setting (Leakage-HI and Leakage-LO)

Please use the up and down arrow keys or the ENTER key and scroll the highlighted area to the **Leakage-HI** or **Leakage-LO** parameter. The display will appear as follows:



Leakage-HI

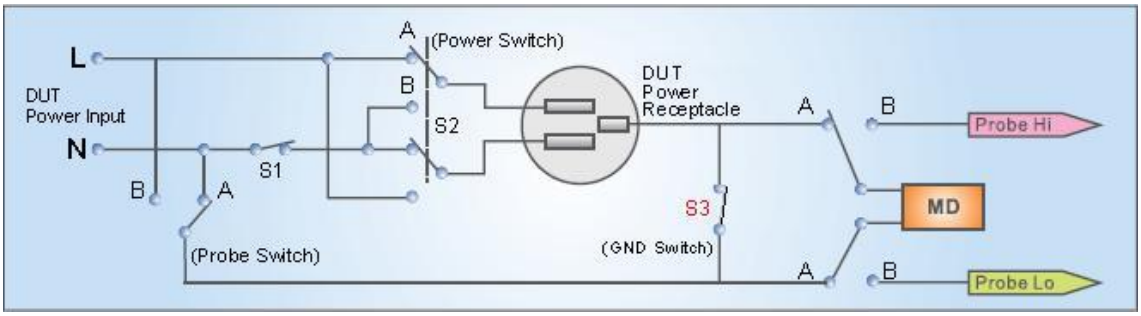


Leakage-LO

Enter the new Leakage current via the numeric keypad and then press the ENTER key to accept the new parameter or press the EXIT key to escape from the edit.

Line Configuration

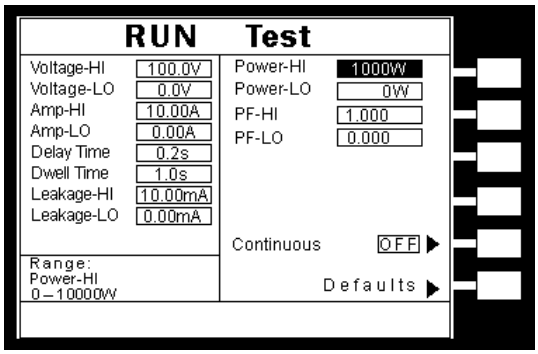
Leakage in the Run Test mode refers to the amount of current, which flows from the enclosure (case) of the DUT, to the neutral side of the line input. The Leakage-HI trip limit is used to program the maximum allowable earth leakage current of the DUT before failure. The Leakage-LO trip limit is used to program the minimum allowable earth leakage current of the DUT before failure. The Leak HI trip limit also controls the earth leakage configuration as shown in FIG.1.



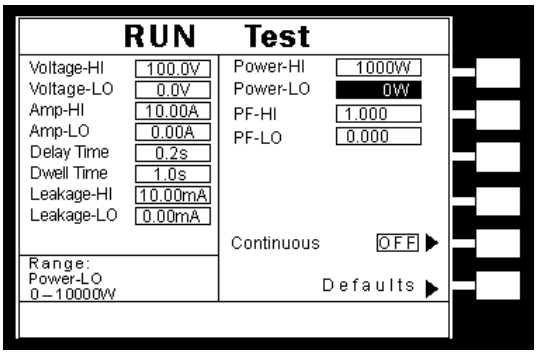
When the Leakage-HI trip limit is set to 0, S3 is closed which disables the earth leakage test and connects the neutral of the DUT input to the ground of the DUT.

4.3.2.5 Power Setting (Power-HI and Power-LO)

Please use the up and down arrow keys or the ENTER key and scroll the highlighted area to the **Power-HI** or **Power -LO** parameter. The display will appear as follows:



Power-HI

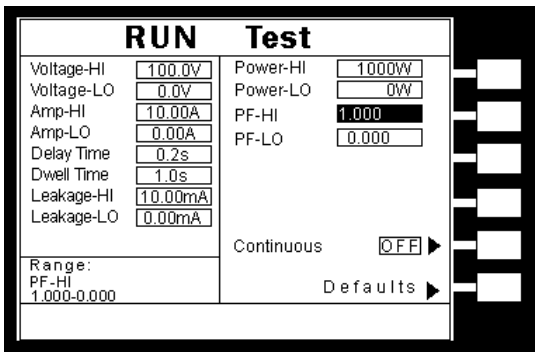


Power-LO

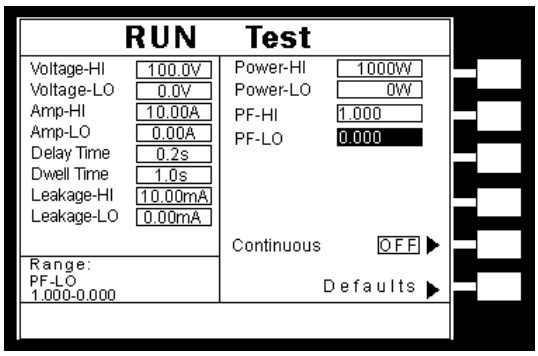
Enter the new power via the numeric keypad and then press the ENTER key to accept the new parameter or press the EXIT key to escape from the edit.

4.3.2.6 Power Factor (PF-HI and PF-LO)

Please use the up and down arrow keys or the ENTER key and scroll the highlighted area to the **PF-HI** or **PF -LO** parameter. The display will appear as follows:



PF-HI



PF-LO

Enter the new PF via the numeric keypad and then press the ENTER key to accept the new parameter or press the EXIT key to escape from the edit.

Power Factor = W/VA where W =Watts (Real Power) and VA =Volts x Amps (apparent power). It is important to note that the closer the power factor is to "1" the more resistive the DUT is. The closer the power factor is to 0 the more reactive (inductive or capacitive) the DUT is.

4.3.2.7 PLC Control (Option for Opt. 752)

Please use the up and down arrow keys or the ENTER key and scroll the highlighted area to the **PLC Control** parameter.

Please press **PLC Control** softkey to select the power mode. If option AC power source to be the DUT input power, there are 7 memories M1 to M7 for selected. If option 1931 series, there are three voltage rate 1.0, 1.06, and 1.1 times for selected. If option 1931S series, there are six voltage rate 0.8, 0.85, 0.9, 1.0, 1.06, and 1.1 times for selected.

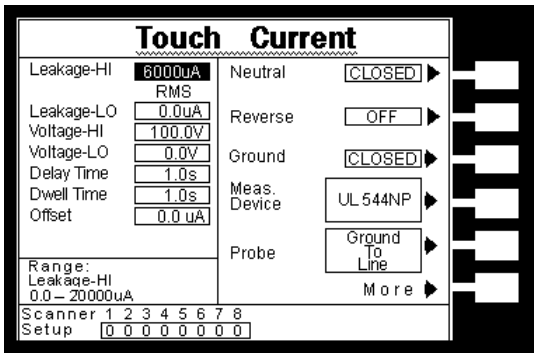
4.3.2.8 Continuous

The softkey can set the output power status for step link. When Continuous is on, and both two link step are at the same line status, the power will continue output during two steps link. If Continuous is on but two link step are not at the same line status, the power will stop output first after first step test is finished.

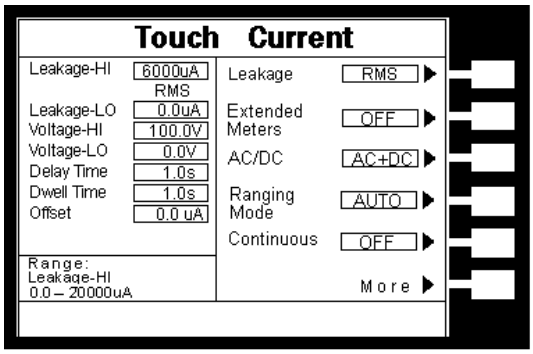
When Continuous is OFF, whenever two link steps are at the same line status or not, it will stop output first after the step test is finished. Then it will restart to process next step.

4.3.3 Touch Current Test

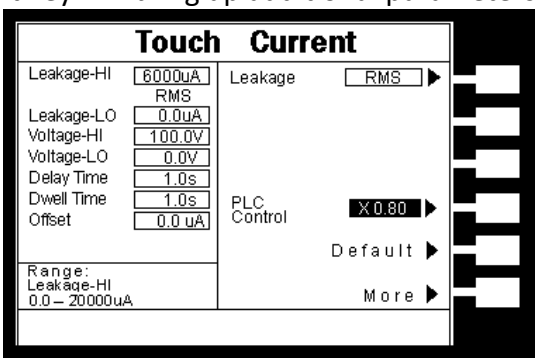
From the Setup Tests, Tests Selection screen, press the “Touch Current” soft key. The Run Test parameter-setting screen will now be displayed. The Touch Current parameter-setting screen will appear as follows:



From the Touch Current parameter-setting screen, the following parameters may be controlled: Leakage-HI, Leakage-LO, Voltage-HI, Delay Time, Dwell Time, Offset, Neutral, Reverse, Ground, Meas. Device, Probe, Leakage. More. Pressing the “More” soft key will bring up additional parameters: Leakage, Extended Meters, AC/DC, Ranging Mode and Continuous.

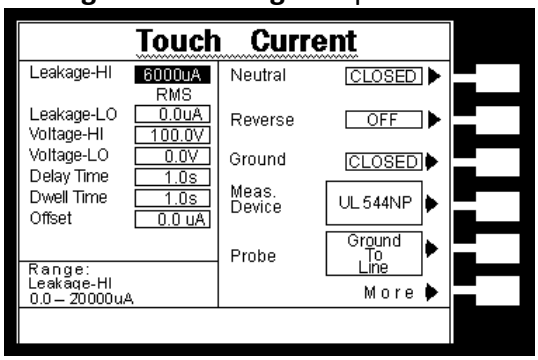


Pressing the “More” soft key will bring up additional parameters: PLC Control, Default, and More.

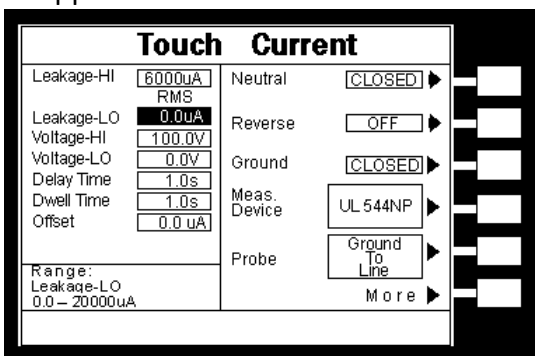


4.3.3.1 Leakage Setting (Leakage-HI and Leakage-LO)

Please use the up and down arrow keys or the ENTER key and scroll the highlighted area to the **Leakage-HI** or **Leakage-LO** parameter. The display will appear as follows:



Leakage-HI

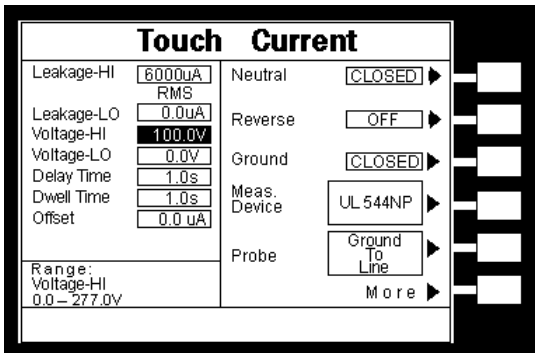


Leakage-LO

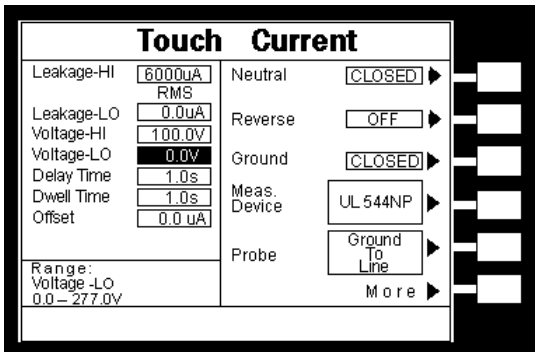
Enter the new current via the numeric keypad and then press the ENTER key to accept the new parameter or press the EXIT key to escape from the edit.

4.3.3.2 Voltage Setting (Voltage-HI and Voltage-LO)

Please use the up and down arrow keys or the ENTER key and scroll the highlighted area to the **Voltage-HI** or **Voltage-LO** parameter. The display will appear as follows:



Voltage-HI

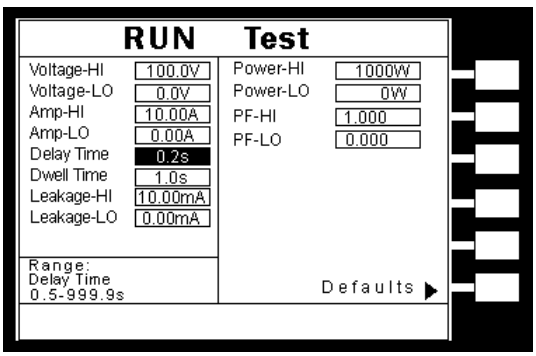


Voltage-LO

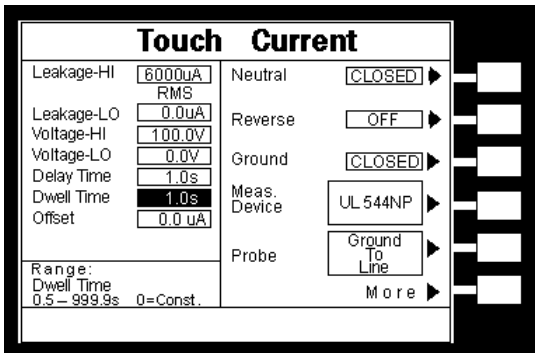
Enter the new voltage via the numeric keypad and then press the ENTER key to accept the new parameter or press the EXIT key to escape from the edit.

4.3.3.3 Delay Time and Dwell Time setting

Please use the up and down arrow keys or the ENTER key and scroll the highlighted area to the **Delay Time** or **Dwell Time** parameter. The display will appear as follows:



Delay Time



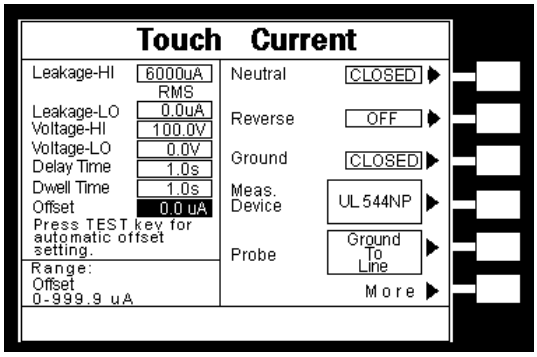
Dwell Time

Enter the new time via the numeric keypad and then press the ENTER key to accept the new parameter or press the EXIT key to escape from the edit.

If the dwell time is set to “0”, the instrument will operate in a continuous mode. It will stop when the DUT (Device Under Test) goes into failure or the “RESET” button is pressed. The minimum dwell time setting is 0.5 seconds.

4.3.3.4 Offset setting

Please use the up and down arrow keys or the ENTER key and scroll the highlighted area to the **Offset** parameter. The display will appear as follows:



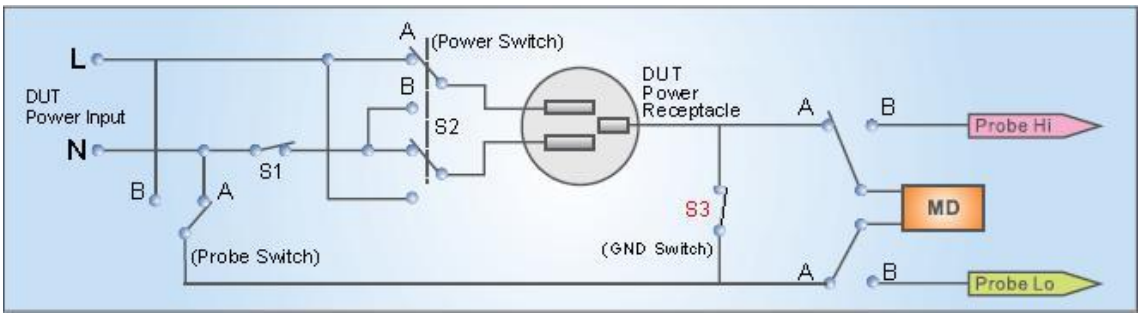
This function allows the instrument to compensate leakage current during a Touch Current test. Using the up and down arrow keys or the ENTER key, scroll the highlighted area to the Offset parameter. You may now manually or automatically set an Offset value.

To manually set an Offset value enter a milliohm value via the numeric keypad and then press the ENTER key to accept the new value or press the EXIT key to escape from the edit.

To automatically set an Offset value, short circuit the ends of the test cables and press the “TEST” button. The highlighted parameter field will briefly show the word “READING” and then the display the new value. The new value is automatically updated in the field and does not allow an

escape to the original value or require that the ENTER key be used to accept the new parameter.

Leakage Current and Offset measuring



Unless the REVERSE parameter is "ON", the OFFSET setting always and indicates the value that S2 is on the A position(OFF). When the REVERSE parameter is "AUTO", system will display the offset value of A position and save the value of B position to RAM to further calculate the leakage of A and B position then indicates the max. one. The calculation of leakage is:

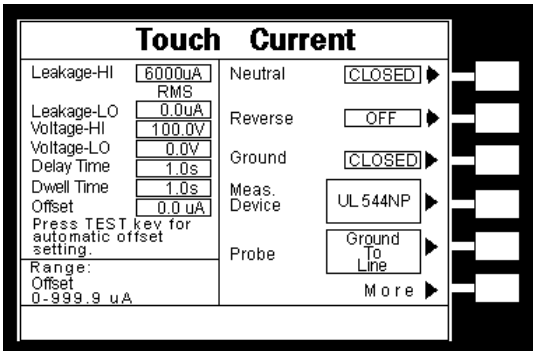
Leakage Current = $\sqrt{\text{READING}^2 - \text{OFFSET}^2}$

The LCD always displays and indicates the max leakage current of test result. For an example：
If the setting of REVERSE and OFFSET parameters are "AUTO", the Offset and leakage value are separately 5.0uA and 145.0uA for B position (ON) and the Offset and leakage value are separately 8.0uA and 140.0u for A position (OFF) after "TEST" was pressed.

For A position (REVERSE=OFF)：Leakage Current = $\sqrt{140.0^2 - 8.0^2}$ =139.8uA
For B position (REVERSE=ON) ：Leakage Current = $\sqrt{145.0^2 - 5.0^2}$ =144.9uA

So the LCD will indicates the Leakage Current is 144.9uA and Offset is 8.0uA.

4.3.3.5 Line Configuration (NEUTRAL; REVERSE; GROUND)
Please use the up and down arrow keys or the ENTER key and scroll the highlighted area to the **NEUTRAL**, **REVERSE**, or **GROUND** parameter. The display will appear as follows:



The LINE configuration is determined by the switches S1, S2 and S3 (refer to Figure 2) and is set using the corresponding Line Configuration Soft keys. S1 relay is represented as NEUTRAL and is controlled by the Neutral soft key. S2 relay is represented as REVERSE and is controlled by the

Reverse soft key. S3 relay is represented as GROUND and is controlled by the Ground soft key.

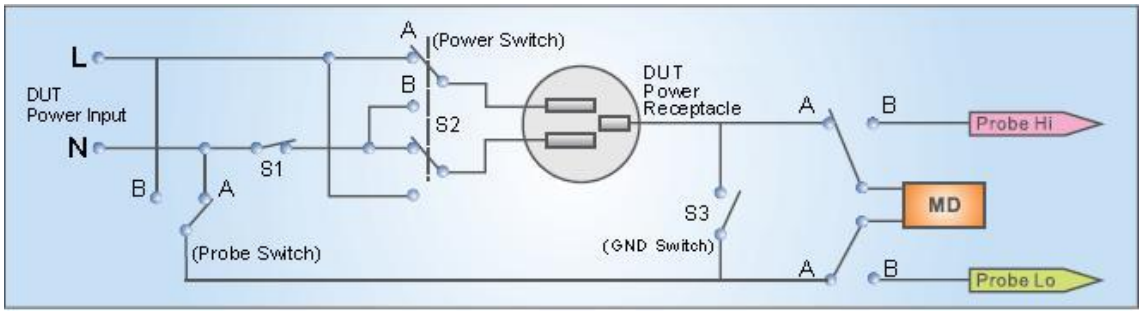


Figure 2

Pressing NEUTRAL or GROUND softkey will toggle it between its two available states ON and OFF. Pressing REVERSE softkey will toggle it between its three available states ON , OFF and AUTO. When REVERSE parameter is set to AUTO, system will measure the circuits of REVERSE is ON and OFF and display the larger value after TEST key is pressed.

Line Configuration Setting

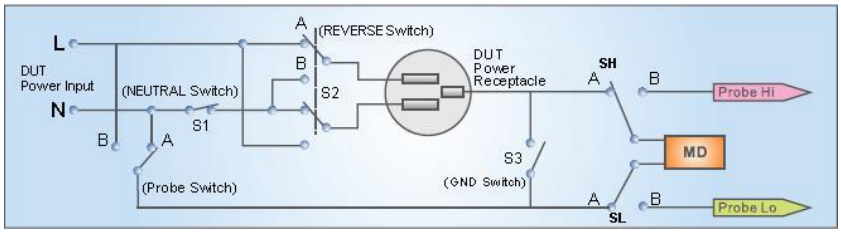
When the Neutral or Ground switches are set to the CLOSED position they are in a normal operating condition. When the Neutral or Ground switches are set to the OPEN position they are in a fault condition that represents a fault in the line input wiring.

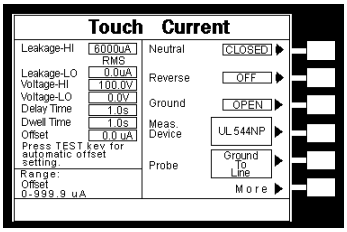
When the REVERSE relay is set to ON, the relay is in position B (refer to Figure 2) and the Line and Neutral conductors are reversed at the DUT power outputs. The power output is represented as the power receptacle in Figure 2.

The three switches may be configured into eight different combinations of Line conditions. The different combinations are represented in the table below (refer to Figure 2).

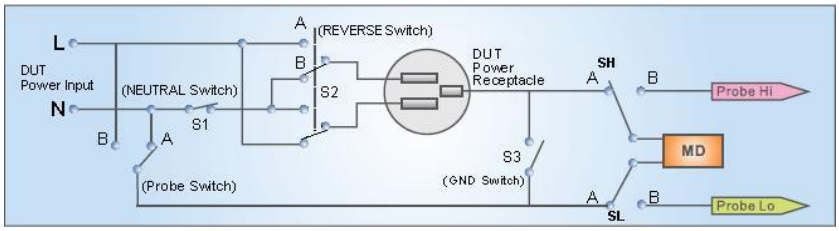
STEP	NEUTRAL	REVERSE	GROUND	DUT Line Configuration
	S1	S2	S3	
1	CLOSED	A (OFF)	OPEN	State 1
2	CLOSED	B (ON)	OPEN	State 2
3	OPEN	A (OFF)	OPEN	State 3
4	OPEN	B (ON)	OPEN	State 4
5	CLOSED	A (OFF)	CLOSED	State 5
6	CLOSED	B (ON)	CLOSED	State 6
7	OPEN	A (OFF)	CLOSED	State 7
8	OPEN	B (ON)	CLOSED	State 8
9	CLOSED	AUTO	OPEN	State 1 & 2
10	OPEN	AUTO	OPEN	State 3 & 4
11	CLOSED	AUTO	CLOSED	State 5 & 6
12	OPEN	AUTO	CLOSED	State 7 & 8

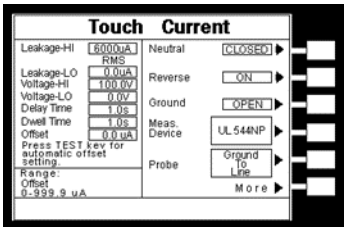
State 1：S1：CLOSED、 S2：A 、 S3：OPEN



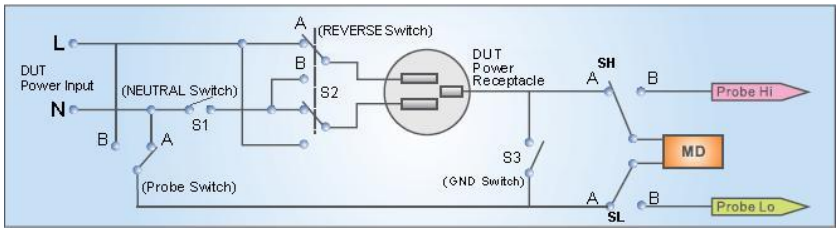


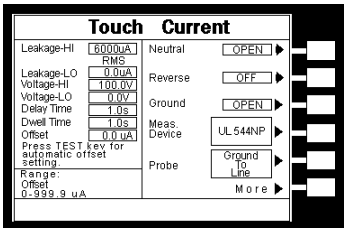
State 2：CLOSED、 S2：B、S3：OPEN



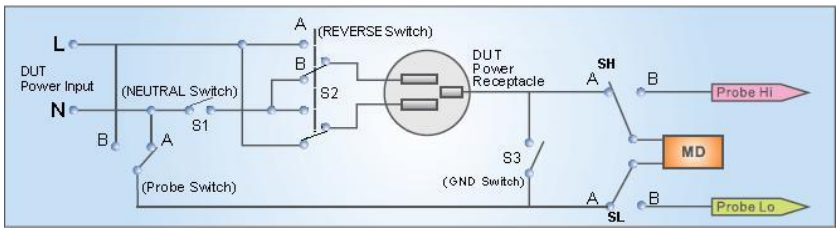


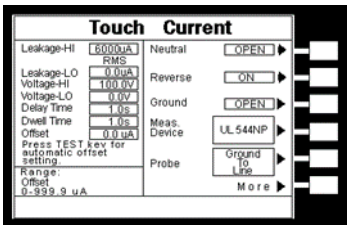
State 3：S1：OPEN、 S2： A、 S3：OPEN



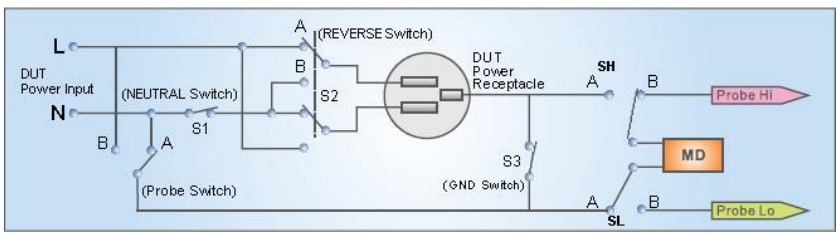


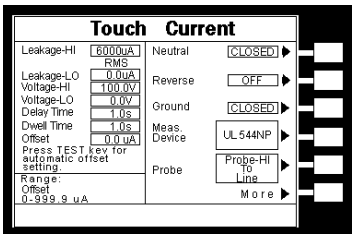
State 4：S1：OPEN、 S2： B 、S3：OPEN



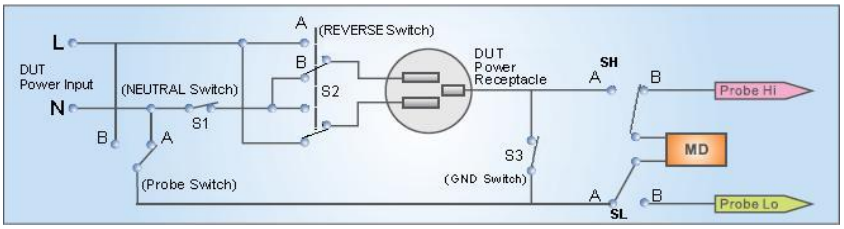


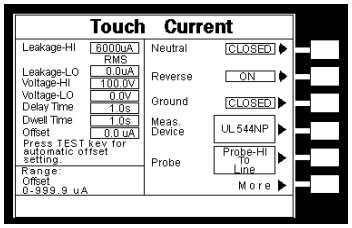
State 5：S1：CLOSED、S2：A 、S3：CLOSED



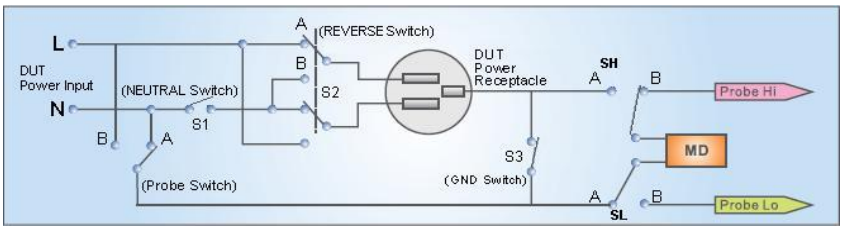


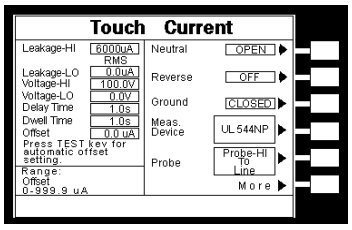
State 6：S1：CLOSED、S2：B、S3：CLOSED



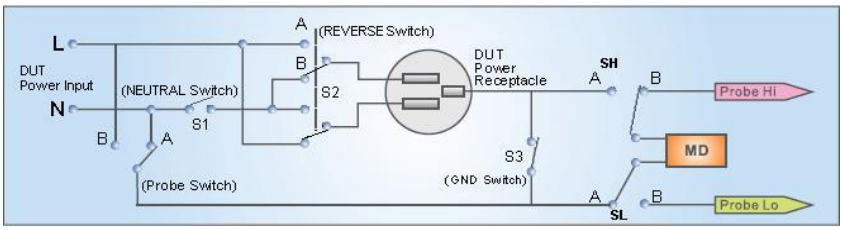


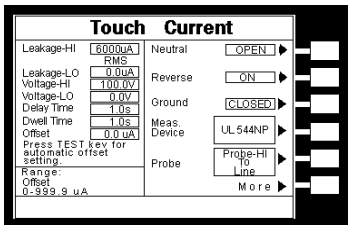
State 7：S1：OPEN、S2：A 、S3：CLOSED





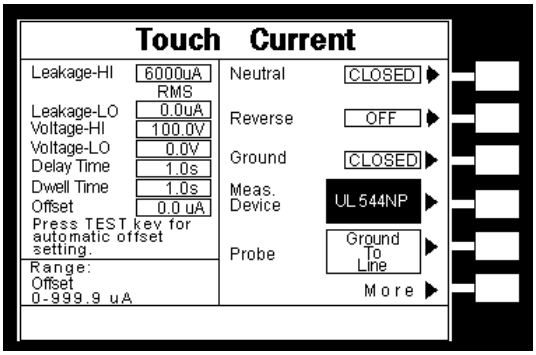
State 8：S1：OPEN、S2：B、S3：CLOSED





4.3.3.6 Meas. Device Setting

Please use the up and down arrow keys or the ENTER key and scroll the highlighted area to the **Meas. Device** parameter. The display will appear as follows:



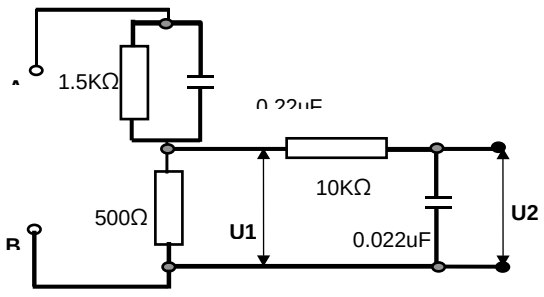
The Measuring Device is an impedance circuit that simulates the human body. The Measuring device is specified differently for different agencies, applications and specifications. Repeatedly pressing the Measure Device soft key will allow you to select one of the many measuring devices listed in the table below. The table below indicates the available measuring devices and the appropriate agency standard to which it correlates.

Cross Reference Letter	GPIB / RS-232 Command	Agency Specification	Application
MD1	**EM4 (U2)** **EM5 (U1)**	IEC60990(Fig 4 U1 & U2)、IEC60598-1、IEC60950-1、 IEC60065、 IEC61010、IEC60335-1、IEC62368	Weighted Touch Current, Luminaries, Information Technology, Audio & video, Laboratory Equipment, Safety of household
MD2	**EM6 (U3)** **EM7 (U1)**	IEC60990(Fig 5 U1 & U3) , IEC60598-1、IEC62368	
MD3	**EM2**	IEC60601-1	Medical Equipment.
MD4	**EM1**	UL544P	Medical Equipment.
MD5	**EM0**	UL544NP、UL484、UL923、UL471、UL867、UL697	Medical Equipment.
MD6	**EM3**	UL1563	Electric Spas, Equipment Assemblies and Associated Equipment.
MD7		IEC60950、IEC61010-1 Fig A.2 (2Kohm)	Information Technology. Laboratory Equipment. (For Opt. 752)
External	**EM8**	External	External
Frequency Check	**EM9**	The Touch Current test can be configured to verify the bandwidth of the leakage current “voltmeter”, by setting the Probe configuration, Probe-HI to Probe-LO, and selecting the medical device “Frequency Check”.	The selection is intended to be used for meter verification only and has no application for normal testing.

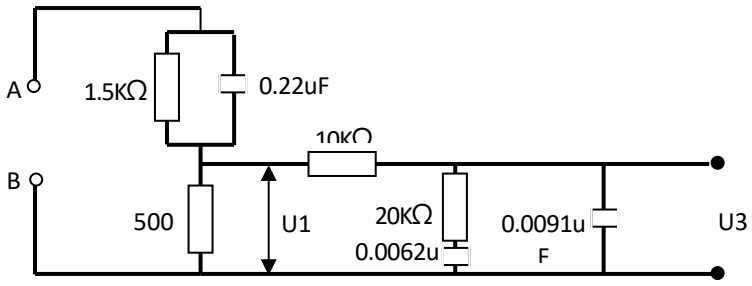
Circuit Diagrams

The following diagrams show the equivalent circuit of the measuring devices. Leakage current readings are generated by measuring the voltage drop across these networks and dividing by the equivalent DC resistance. The voltmeter is placed across the entire network of the measuring devices3、4、5、6 and 7. The voltmeter is placed across the points indicated by the solid black dots on measuring device 1 and 2. The points are specified by the agencies that require a particular measuring device to meet their specification.

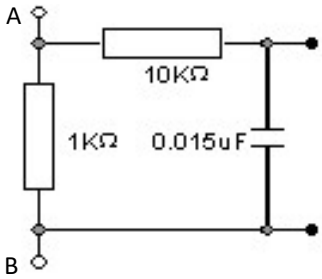
MD 1： IEC60990(Fig 4 U1 & U2)、IEC60950-1、IEC60598-1、IEC60065、IEC61010、IEC62368



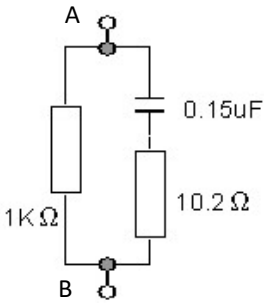
MD2： IEC60990(Fig 5 U1 & U3) , IEC60598-1 、IEC62368



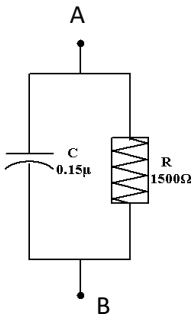
MD3： IEC60601-1



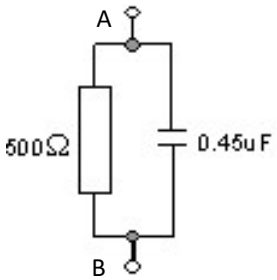
MD4：UL544P



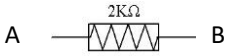
MD5： UL544NP 、UL484 、UL923 、UL471 、UL867 、UL697

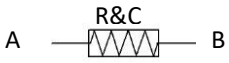


MD6：UL1563



MD7：IEC60950 、IEC61010-1 Fig A.2 External MD(Option) (2Kohm) for RUN Test MD Circuit





External Measuring Device

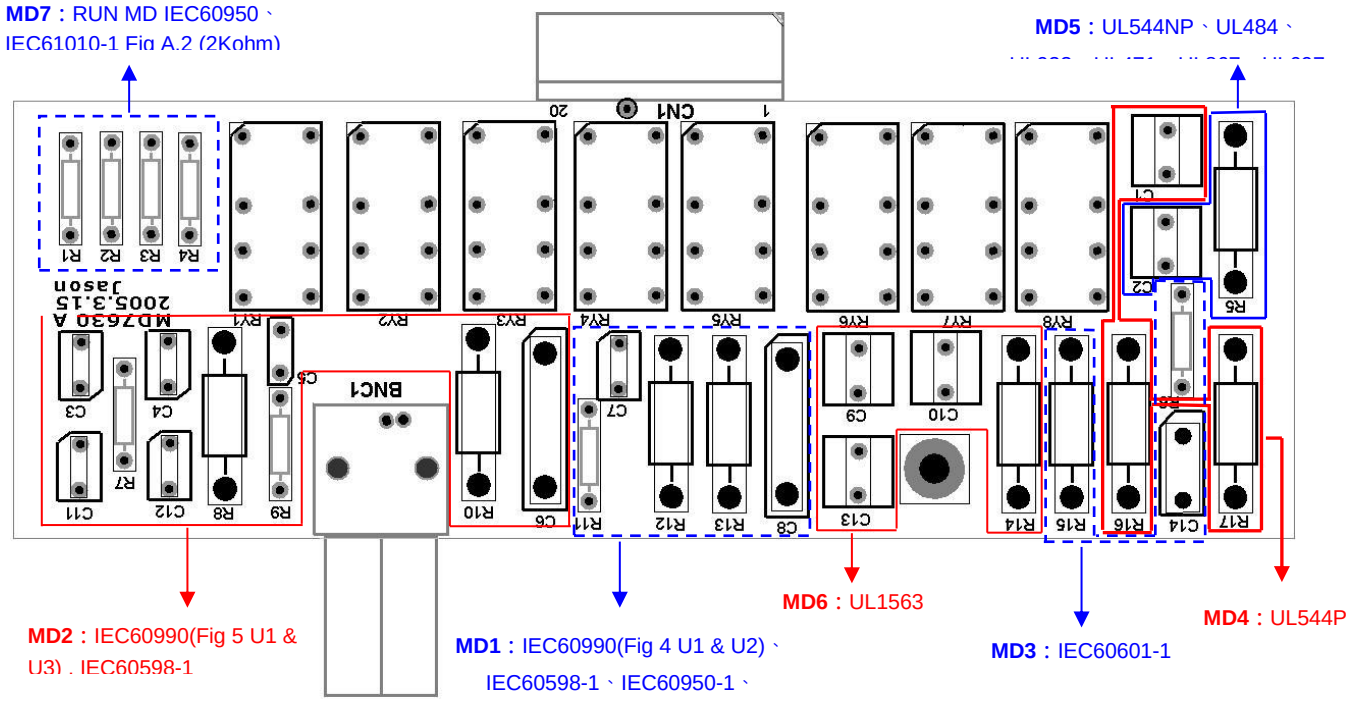
The 7630 has an access panel on the back of the instrument that can be removed to access the MD external PCB. The MD external PCB may be configured for a simple resistive measuring device or a two-pole measuring device similar to MD 7. The PCB comes configured with a 1kΩ measuring device.

Frequency Check

The Touch Current test can be configured to verify the bandwidth of the leakage current "voltmeter" by setting the Probe configuration, Probe-HI to Probe-LO, and selecting the medical device "Frequency Check". The selection is intended for meter verification purposes only and has no application for normal testing. The calculation of the displayed leakage current will use 1000 Ω for R in the calculation of V/R=I where I is the leakage current displayed and V is voltage across the measuring device (MD). When an external frequency generator is applied to the probe inputs, the

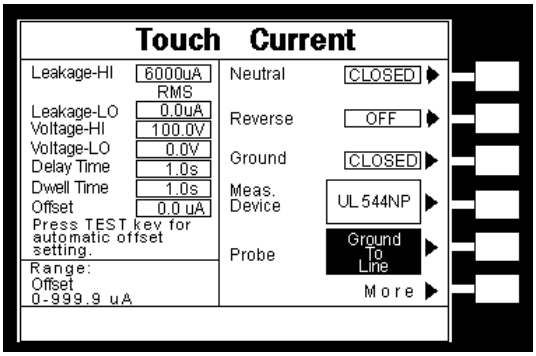
current display will be equal to Voltage generator/1000. The readings can then be correlated to verify the voltmeter bandwidth. Since the voltage is being applied directly across the MD voltmeter amplifier inputs, it is not necessary to actually install a 1KΩ resistor to the external MD input. It is necessary to have the 0Ω resistors installed in position R1 and R3 on the external measuring device PCB to operate in this mode. If the external measuring device has been populated in a different configuration, it will be necessary to create a temporary short on R1 and R3 to operate in this mode. Another option would be to acquire a spare external measuring device PCB for the meter verification purpose.

MD Block Diagram



4.3.3.7 Probe Configuration

Please use the up and down arrow keys or the ENTER key and scroll the highlighted area to the **Probe** parameter. The display will appear as follows:



The Probe configuration is controlled by the relays SH, SL and Probe Switch shown in Figure 2 and are set by the Probe soft key. These three relays configure the current measuring device into four possible positions. Repeatedly pressing the Probe soft key allows the selection of the four different states. The four positions are described in the table below.

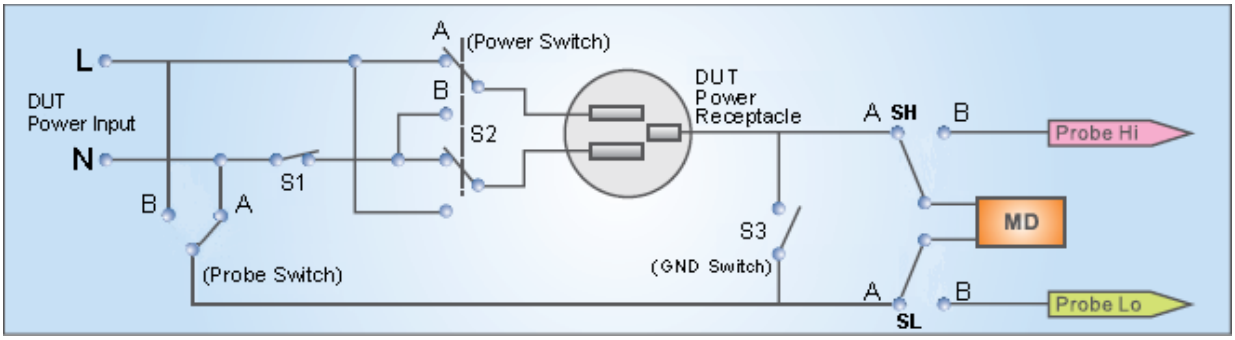
Probe (Measuring Device Position)	**Switch**			**Agency Test Application**
	SH	**SL**	**Probe Switch**	
Ground To Line	A	A	A	Earth Leakage Current
Probe-HI To Line	B	A	A	Surface to Touch Current
Probe-HI To Probe-LO	B	B	A	Surface to Surface Leakage Current
Ground To Neutral	A	A	B	Earth Leakage Current
AUTO	A	A	A 、 B	Earth Leakage Current

Note：1. If REVERSE parameter is ON or AUTO, probe will not have the **Ground To Neutral** and **AUTO** selection items.
2. It belongs to the application of Standard IEC 60335-1 Fig.2 that both the switch SH and SL are on the A position.

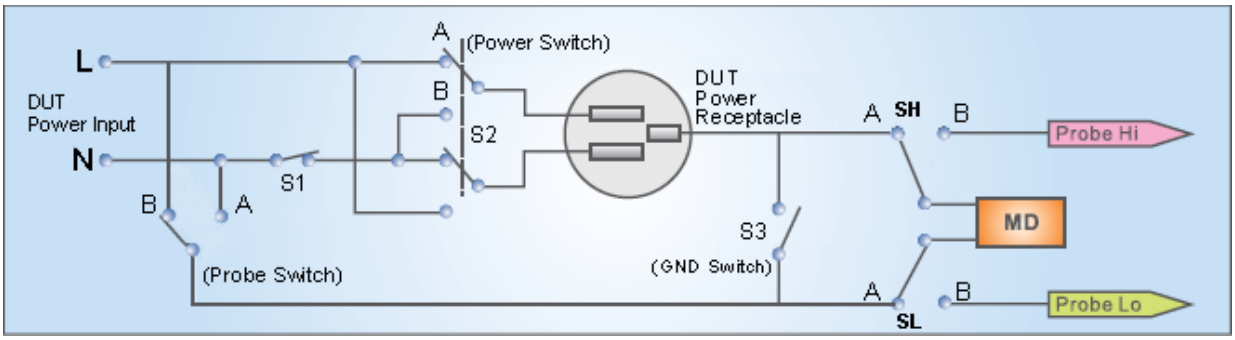
When the Probe is set to AUTO, the system will measure the leakage current that probe switch is on A and B position. Whichever is larger, the LCD always displays the larger value.

Leakage Measuring

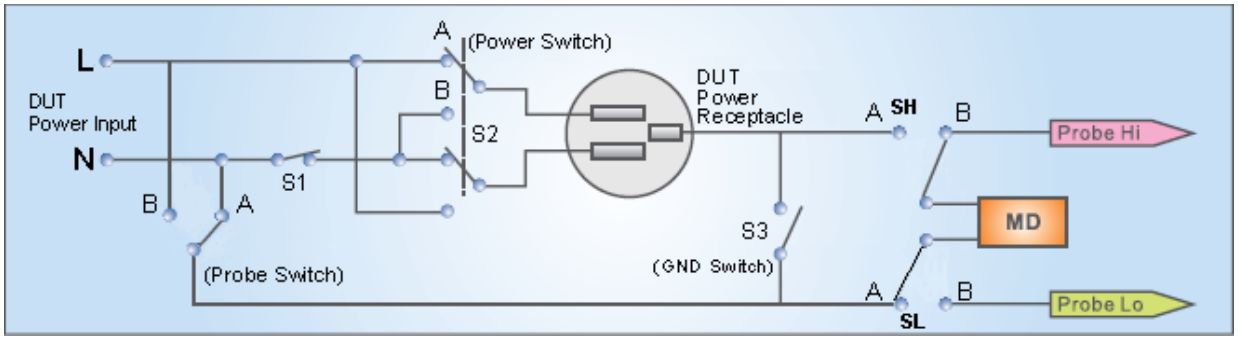
1. **Ground To Line (G-L)**：SH, SL and Probe Switch are on A position.



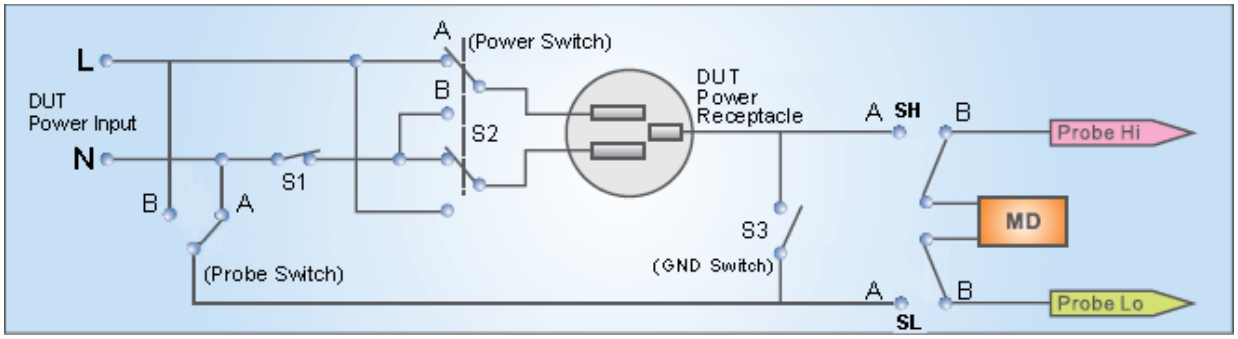
2. **Ground To Neutral (G-N)**：SH and SL are on A position，Probe Switch is on B position.



3. **Probe-HI To Line (PH-L)**：SH is on B position, SL and Probe Switch are on A position.

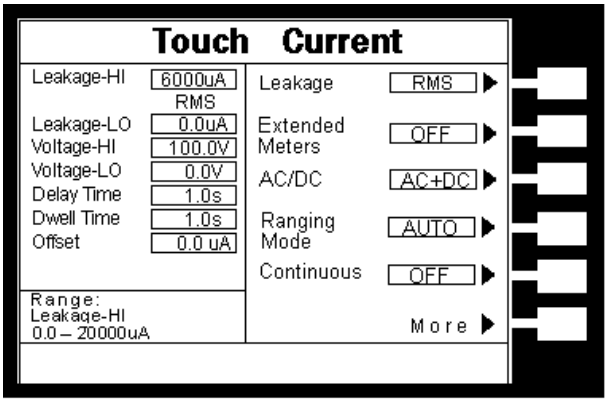


4. **Probe-HI To Probe-LO (PH-PL)**：SH and SL are on B position，Probe Switch is on A position.



4.3.3.8 Leakage Setting

Please use the up and down arrow keys or the ENTER key and scroll the highlighted area to the **Leakage** parameter. The display will appear as follows:

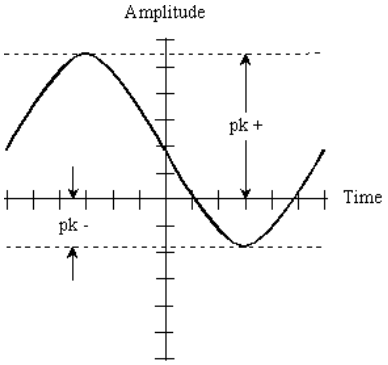


The Touch Current test can be configured to meter the leakage current in RMS or Peak. The RMS/Peak configuration is set by the pressing the Leakage softkey while the Leakage-HI or Leakage-LO parameter is highlighted.

RMS and Peak Definitions

RMS (Root-Mean-Square): For a sine wave, the RMS value is 0.707 times the peak value.

Peak: Peak (pk) is the maximum value, either positive (pk+) or negative (pk-), that the current waveform attains.



For a sine wave without a DC component, the peak amplitude is equal to approximately 1.414 times the root-mean-square amplitude.

4.3.3.9 Extended Meters

When Extended Meters is on, it can be switched to display I-maximum or MD Voltage by press ENTER key during testing. When Extended Meters is off, the switch function is disable.
I-maximum function will measure and display the max. current for each test. MD Voltage function will measure and display the voltage between two terminal of MD.

4.3.3.10 AC / DC Display Selection (Option)

Pressed AC/DC softkey, user can select the leakage current value to be AC+DC, AC or DC.

4.3.3.11 Ranging Mode Setting

When Ranging Mode is Auto, system will auto select the suitable current range. At the mode, Dwell time can't be shorter than Ranging judgment time. If Dwell time is shorter than Ranging judgment time, the Dwell time will be forced to be changed to same as Ranging judgment time.

When Ranging Mode is Manual, system will judge the current range depends on Leakage-HI setting.

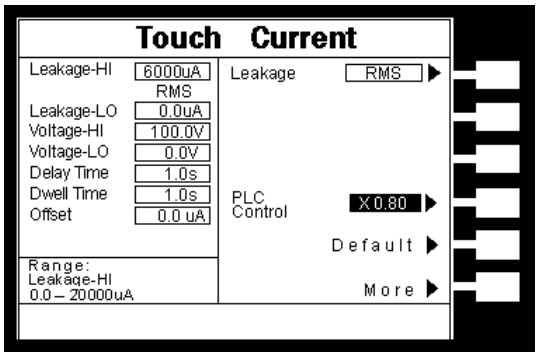
4.3.3.12 Continuous Setting

The softkey can set the output power status for step link. When Continuous is on, and both two link step are at the same line status, the power will continue output during two steps link. If Continuous is on but two link step are not at the same line status, the power will stop output first after first step test is finished.

When Continuous is OFF, whenever two link steps are at the same line status or not, it will stop output first after the step test is finished. Then it will restart to process next step.

PLC Control

Please use the up and down arrow keys or the ENTER key and scroll the highlighted area to the **PLC Control** parameter. The display will appear as follows:



Please press **PLC Control** softkey to select the power mode. If option AC power source to be the DUT input power, there are 7 memories M1 to M7 for selected.

4.5 Setting Up a Test

1. Upon power up, 7630 will initialize with the test file that was last used before power down. New instruments come loaded with one default file, this is the file that the instrument will "Boot Up" with until it is changed.

2. From the Setup Tests screen, press the "File" soft key, The File Setup screen will now be displayed.

3. From the File Setup screen, press the soft key "New File". The Create File screen will now be displayed.

4. The Create File screen is separated into three main sections, Alphabet and Symbols, File Name edit, and soft key menu.

5. From the Create File screen, you must give your new test file a name. The file name can be a maximum of ten characters in length and may use any combination of the character set plus numbers. To name your file, use the arrow keys to scroll the highlighted area to the character (or enter a number from the numeric keypad) you wish to use and then press the "Select" soft key. At the File Name edit, the letter or symbol will be inserted at the point where the cursor is flashing. The cursor will then increment to the next position and wait for an additional character insertion. If you make a mistake or want to change the character, press the backspace key in the numeric keypad. The cursor will decrement and erase the character. When you have finished editing the file name press the ENTER key.

6. From the Setup Tests screen, press the "Add" soft key. The Setup Test, Tests Selection screen will now be displayed. From this screen you may choose what type of test to perform, Touch Current, or Run Test.

7. From the Setup Test, Test Selection screen, press the soft key next to the type of test you wish to add to the test sequence. The Parameter-setting screen for the type of test you have chosen will now be displayed.

8. From Parameter-setting screen, you may set your own custom set of parameters for the test or choose the defaults from the soft key menu. All of the individual parameters for the test may be accessed using the up and down arrow keys, and the ENTER key. As the arrow keys are pressed, the highlighted area will scroll to the different parameters. The ENTER key may also be used to scroll to the different parameters.

9. Scroll to a parameter you wish to edit. The parameter that is highlighted may now be edited. (Refer to Section 4.3 of this manual for complete parameter entry instructions.) Enter a new number via the numeric keypad. Once you begin typing a new number, the parameter will blank and the cursor will begin blinking. This indicates that the parameter is being edited. Once a parameter is edited, it is necessary to complete the edit either by pressing the ENTER key to accept the new number or the EXIT key to escape from the edit and return to the original number.

10. Press the EXIT key to "Add" this test to the sequence of tests. The Setup Tests screen will now be displayed which will include the parameters for the test you have just added.

11. At this point, you may add more tests to the sequence, insert tests, insert prompts, perform the test sequence, or store the sequence to the file name you created.

Adding More tests to the Sequence
To add more tests to the sequence simply repeat steps 5-10 of this section.

Performing a Test from the Setup Tests screen
To perform the test you have just created press the ENTER key. The Perform Tests screen will now be displayed along with a pop-up message that appears as follows:

Pressing the Enter key will store the file with the file name you gave it and go to the Perform Test screen. You may now perform a test (Refer to section **5.2 Performing Tests**).

Pressing the Exit key will return you to the Main Menu and not save the file. Even though the file has not been saved, the file will be retained in RAM until another file is loaded or created, or until the instrument is powered down.

Saving the Test File
From the Setup Tests screen, press the "File" soft key. The File Setup screen will now be displayed.

From the File Setup screen, press the "Save" soft key. The file will save to the name you created and the Setup Tests screen will now be displayed with the new file loaded.

The instrument is now ready to perform tests with the new file. You may now press the ENTER key to go to the Perform Tests screen or press the EXIT key to return to the Main Menu.

Inserting Tests
From the Setup Tests screen, scroll the highlighted area to the step in the sequence where you would like to insert a test.

Press the “Add” soft key. The highlighted area will blank and the test that was originally at this step in the sequence, as well as all of following steps, will increment. Simultaneously, Setup Test, Tests Selection screen will now be displayed.

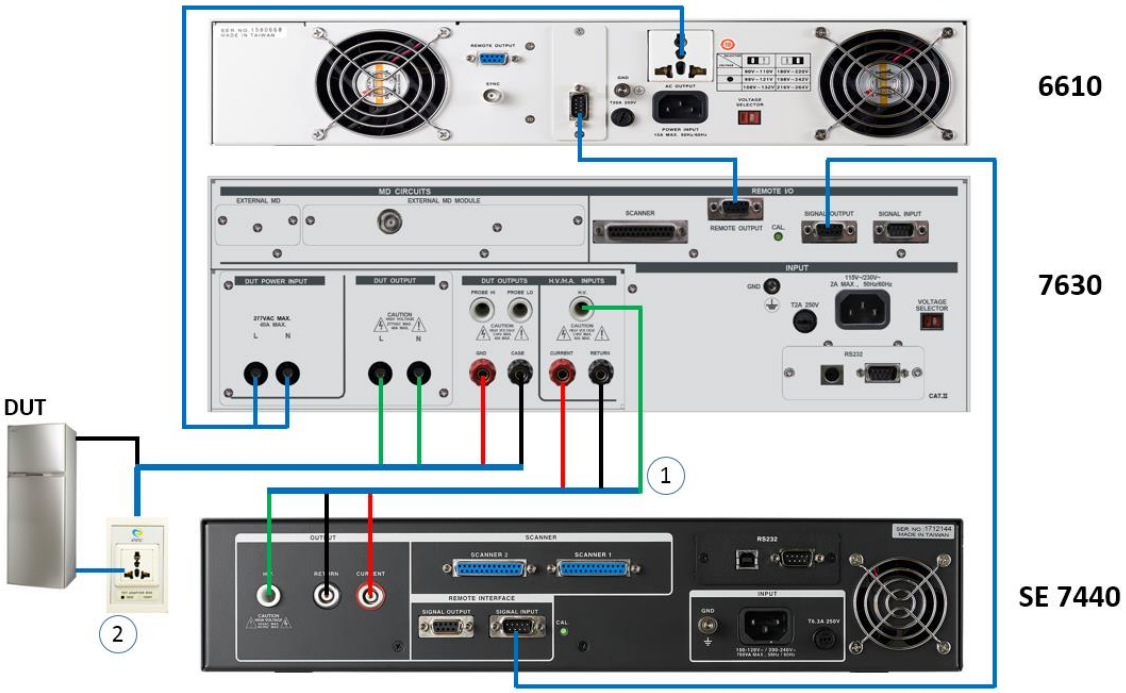
You may now select the type of test you wish to insert from the soft key menu.

Inserting a Text Prompt
Refer to section **4.2.4 Prompt** for a detailed description of inserting text prompts.

5. Operating Instructions

5.1 Instrument Connections

The following diagrams show how to connect Safety Tester to the 7630 to the device under test.

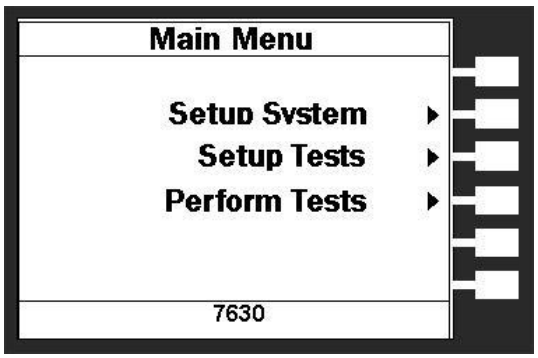


- **Line 1: Accessories 1223, which can be used to connect the safety tester output signal with the 7630 OPT.754 module**
- **Line 2: Accessories 1932, which can be used to connect the OPT.754 module of 7630 to the object to be tested for pressure resistance and grounding impedance test**

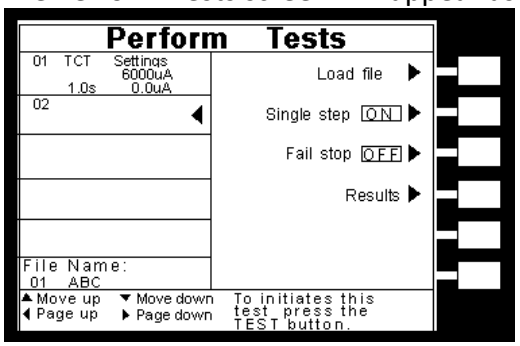
The PLC Remote setting of 7630 must set to OFF and safety Tester must set to ON.

5.2 Perform Tests

From the Main Menu screen, press the soft key “Perform Tests”.



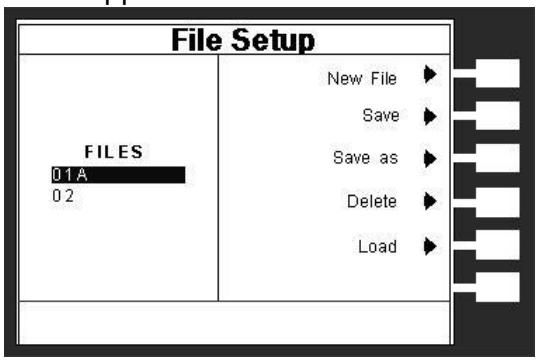
The Perform Tests Menu will now be displayed. From the Perform Tests screen, four different software controls may be accessed, Load File, Single Step (ON/OFF), Fail Stop (ON/OFF), Results. The arrow keys may also be used to scroll the highlighted area to a specific test or page of tests if the file is larger than 5 steps. The Perform Tests screen will appear as follows:



The Perform Tests screen is the main operational screen of instrument. From this screen, individual steps are monitored while the test is being performed. At the end of a sequence of tests, all of the step results may be recalled via the “Results” soft key on this screen. This screen may also be used to debug test files with the use of the single step and fail stop functions.

5.2.1 Load File

From the Perform Tests screen, press the “Load File” soft key. The Load File screen will now be displayed. The Load File screen will appear as follows:



Using the up and down arrow keys, scroll the highlighted area to the File you would like to load

and press the “Load” soft key. The file you selected will now load and the screen will revert to the Perform Tests screen.

5.2.2 Single Step

Single step is a function that allows you to run one step at a time from a sequence of tests. At the Perform Tests screen, use the up and down arrow keys or the ENTER key to scroll the highlighted area to the step you wish to perform. Press the TEST button and the instrument will initiate the single step and stop when finished without continuing to the next step. If you press Test again without first pressing Reset, the next step will initiate, run to completion and then stop. If a step fails and you wish to continue to the next step do not press Reset, if you press Reset it will return you to the original starting step. After running a single step test, a prompt will appear below the test file name telling you to Press TEST button to continue.

You may single step through an entire sequence in this way as long as you do not press Reset. Once Reset is pressed it will return you to the originally selected step.

Turn the Single Step function ON and OFF by pressing the “Single Step” soft key. However, if Security is enabled, single step may not be turned ON and OFF at the Perform Test screen. Whatever state single step is in at the time security is enabled, is the state at which it shall remain.

5.2.3 Fail Stop

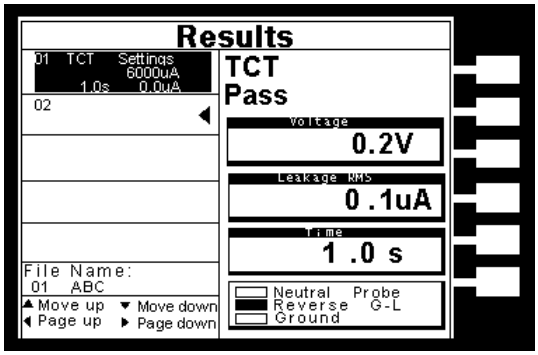
Fail Stop is a function that will stop a sequence of tests at the step if a failure occurs. If the fail stop is turned “ON” and a failure occurs (stopping the test), pressing the Test button again will start the test sequence at the next step. If a step fails and you wish to continue to the next step do not press Reset, if you press Reset it will return you to the original starting step. If this function is turned off, the sequence of tests will continue to the end of the sequence regardless of whether or not a failure has occurred. If the Fail stop is off and a failure occurs during the test sequence, the RESET button will light and a short alarm will sound but the sequence will continue to the end. At the end of the test sequence, the RESET button will light and alarm will sound indicating failure during the sequence. Pressing the RESET button will silence the alarm and reset the instrument. Turn the Fail Stop function ON and OFF by pressing the “Fail Stop” soft key. If security is enabled you may not turn Fail Stop ON and OFF using the “Fail Stop” soft key. Fail Stop automatically defaults to the setting stored in the file when security is activated.

Fail Stop with Run and Touch Current tests

eec recommends performing a Hipot test, with the Fail Stop “ON”, prior to performing a Run Test or Touch Current test. Performing a Hipot test first can detect if a DUT is shorted line to ground before applying line power to it.

5.2.4 Results

At the end of a test sequence or single step test, you may review the measurements of each test by pressing the “Results” soft key. Results may be accessed from the end of test Summary screen or from the Perform Tests screen. The end of test Summary screen appears as follows:



Using the up and down arrow keys, scroll the highlighted area to the step results you wish to review. The left and right arrow keys may be used to page through results if the test contains more than five steps. When the highlighted area is on the step you are reviewing, the test settings will be displayed in the highlighted area and the results will appear on the right in the form of metering screens. The result screens will appear differently for each type of test. The results screens are based on the Performing Tests metering screens and are identical in appearance except for the title.

5.3 Displayed Messages

Directly above the Metering screens is the Test status display. This portion of the display is active during the test and allows you to view the type of test being performed and status of the test step. At the end of a test, the Test status display will either inform you that the test has passed or give a direct indication of the kind of failure that occurred during the test.

5.3.1 Test Status Messages

Dwell
This message appears on the display while a test is in process, the values update in real time.

Delay
This message appears on the display while a test is in process, the values update in real time.

Pass
This message appears on the display when the test process is complete and the DUT passed the test.

Abort
This message appears on the display if the test in process is aborted with the RESET button or remote Reset control.

Short
This message appears on the display if the DUT current is well beyond the metering range of the test.

Output-Error
This message appears on the display, if the instruments output reading does not match the setting. This message will only be seen if the Exit key is press at the Output Error screen. If the instrument has an output problem when the TEST button is pressed, the Output Error screen will appear .

The RESET button is not active in this situation. Only the Exit soft key will allow you to return to the Perform Test screen.

OTP-Fail
This message appears on the display if the Power Amplifier has overheated. This is abnormal condition; please call to the factory for assistance.

Volt-HI
This message appears on the display if the DUT/IP voltage exceeds the Volt-HI Trip setting.

Volt -LO
This message appears on the display if the DUT/IP voltage drops below the Volt-LO Trip setting.

Amp-HI
This message appears on the display if the current exceeds the Amp-HI Trip setting

Amp-LO
This message appears on the display if the current drops below the Amp-LO Trip setting.

Line-OC
This message appears on the display if the 20 Amp < 1 s, short circuit protection is tripped.

Power-HI
This message appears on the display if the DUT input wattage exceeds the Power-HI Trip setting.

Power-LO
This message appears on the display if the DUT input wattage drops below the Power-LO Trip setting.

PF-HI
This message appears on the display if the Power Factor exceeds the PF-HI Trip setting.

PF-LO
This message appears on the display if the Power Factor drops below the PF-LO Trip setting.

Leak-HI
This message appears on the display if the enclosure to neutral leakage current exceeds the Leak-HI Trip setting.

Leak-LO
This message appears on the display if the enclosure to neutral leakage current drops below the Leak-LO Trip setting.

Neutral-V
This message appears on the display if there is voltage present on the Neutral of the DUT input receptacle.

Leak-OC
This message appears on the display if the voltage of MD circuit exceeds the rating voltage.

5.3.2 Fatal Error

All of the buttons and keys are not active in this situation. This type of failure permanently locks the instrument in the “Fatal Error” mode and requires that the instrument be serviced by eec . The customer should contacteec to receive further instruction.

The following Fatal Error identification numbers will represent type of the failure that has occurred:

Error Code 9001 will appear on the display, if the instrument has a recognizable internal component failure.

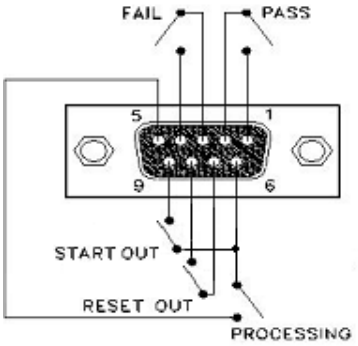
Error Code 9002 will appear on the display, if the instrument’s System data or the Model/Option/Serial Number data are corrupted and do not match the settings.

Error Code 9003 will appear on the display, if the instrument’s Calibration data is corrupted.

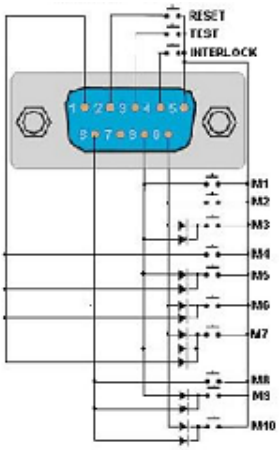
6. Interface

6.1 Connection of Remote I/O

Two 9-pin “D” type connectors are mounted on the rear panel that provide REMOTE-INPUT-OUTPUT control and information. These connectors mate with standard 9 pin D-sub-miniature connector provided by the user. The output mates to a male (plug) connector while the input mates to a female (receptacle) connector. For best performance, a shielded cable should be used. To avoid ground loops the shield should not be grounded at both ends of the cable. Suggested AMP part numbers for interconnecting to the Remote I/O are shown below:



Signal Output



Signal Intput

6.1.2 Signal Outputs on Remote I/O

The rear panel connector provides three output signals to remotely monitor PASS, FAIL, and PROCESSING conditions. The monitoring signals are provided by three normally open internal relays, that switch on to indicate the current condition of the tester. These are normally open free contacts and will not provide any voltage or current. The ratings of the contacts are 1A / 125 VAC (0.5 ADC). The signal outputs are provided on the 9-pin female D connector. Below is a listing that indicates what conditions activate each pin. When a terminal becomes active the relay closes thereby allowing the external voltage to operate an external device.

Pins 1 and 2 provide the PASS signal.
Pins 3 and 4 provide the FAIL signal.
Pins 5 and 6 provide the PROCESSING signal.
Pins 7 and 8 provide the RESET OUT signal.
Pins 7 and 9 provide the START OUT signal.

The following describes how the relays operate for each test condition.

PROCESSING - The relay contact closes the connection between pin (5) and pin (6) while the instrument is performing a test. The connection is opened at the end of the test.

PASS - The relay contact closes the connection between pin (1) and pin (2) after detecting that the item under test passed all tests. The connection is opened when the next test is initiated or the reset function is activated.

FAIL - The relay contact closes the connection between pin (3) and pin (4) after detecting that the item under test failed. The connection will open when the next test is initiated or the reset function activated.

RESET OUT- The relay contact closes the connection between pin (8) and pin (7) while the RESET bottom is pressed.

START OUT- The relay contact closes the connection between pin (9) and pin (7) while the TEST bottom is pressed.

6.1.2 Signal Inputs of Remote I/O and Programmed Test Files

The 7630 remote connector enables remote operation of the TEST, RESET and REMOTE INTERLOCK functions, and allows the operator to select one of 10 pre-programmed test files.

When the PLC Remote mode is on, the 7630 will respond to simple switch or relay contacts closures. A normally open momentary switch can be wired across pins 3 and 5 to allow remote operation of the TEST function. A normally open momentary switch can be wired across pins 2 and 5 to allow remote operation of the RESET function. When the PLC remote function is (ON) the TEST switch on the front panel will be disabled to prevent a test from being activated through this switch. For safety, the front panel RESET switch remains active even when a remote reset switch is connected so that high voltage can be shut down from either location.

The Remote File Select function gives the user the capability to quickly change parameters and initiate a test remotely. Ten pre-programmed test files can be accessed by connecting pins 1,6,8, and 9 to the common pin 7, in different combinations. The **Remote File Select Truth Table** (binary) shows the different combinations of momentary switch (relay) closures, and which memory programs that will be selected as the result. It may be necessary to "OR" the momentary switches (relay contacts) to prevent incorrect program selection due to timing errors.

REMOTE FILE SELECT TRUTH TABLE				
BIT 4	BIT 3	BIT 2	BIT 1	FILE #
0	**0**	**0**	**1**	01
0	**0**	**1**	**0**	02
0	**0**	**1**	**1**	03
0	**1**	**0**	**0**	04

0	**1**	**0**	**1**	05
0	**1**	**1**	**0**	06
0	**1**	**1**	**1**	07
1	**0**	**0**	**0**	08
1	**0**	**0**	**1**	09
1	**0**	**1**	**0**	10
1= Momentary Contact closure between BIT and COMMON				
0= No Contact closure between BIT and COMMON				

WARNING Activating file program functions through the remote connector selects the file and starts the test that is pre-programmed into that file.

CAUTION Do not connect voltage or current to the signal inputs. Applying voltage to the signal input could result in damage to the control circuitry.

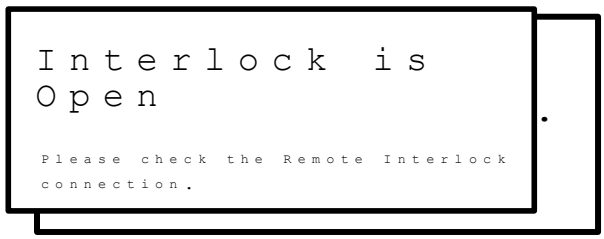
Remote Interlock

7630 is equipped with a featured referred to as “Remote Interlock”. Remote Interlock is a feature that utilizes a set of closed contacts to enable the instruments output. In other words, if the Interlock contacts open, the output of the instrument will be disabled. Remote Interlock could also be referred to as a remote system lockout, utilizing “Fail When Open” logic. If the Interlock contacts are open and the Test button is pushed, a pop-up message will be displayed on the screen for two seconds. The message will appear as follows:
If the Interlock contacts are opened during a test, the pop-up message will be displayed and the test will abort. The hardware and has been configured to provide the interlock connections on pins 4 and 5 of the Remote Interface, Signal Input port. The instrument can still be used

If the Interlock contacts are opened during a test, the pop-up message will be displayed and the test will abort. The hardware and has been configured to provide the interlock connections on pins 4 and 5 of the Remote Interface, Signal Input port. The instrument can still be used without the external interlock device as long as the Interlock Connector (1505 provided with unit) is plugged into the Remote Interface, Signal Input port. If there is nothing connected to the Remote Interface, Signal Input port to provide a connection to the interlock, the instrument will not perform tests.

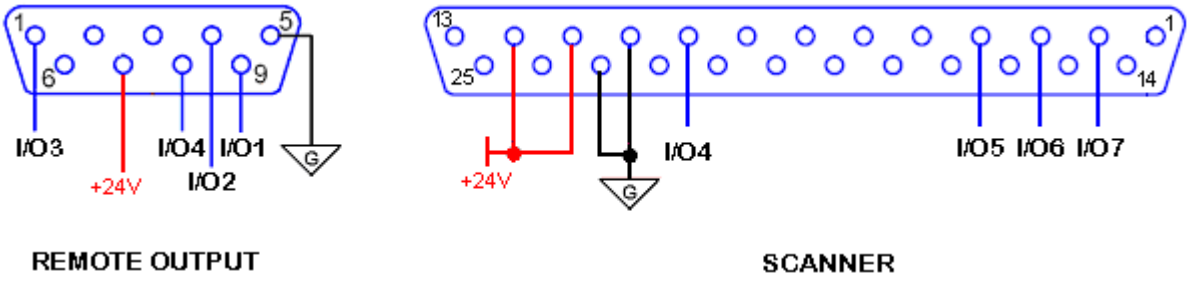
PLC Remote Pop-up message

If you attempt to start a test from the front panel Test button and the PLC remote function is turned “ON”, a pop-up message will be displayed. The pop-up message will appear as follows:



6.2 Scanner & Input Source I/O Signal Control Interface

One 9-pin “D” type and one 25-pin connectors are mounted on the rear panel to be the signal control interface of SCANNER and input power .There are 7 I/O control signal for REMOTE OUTPUT and SCANNER interface, and the signal cable must be prepared by user. All of the I/O signal can be used at the same time, but REMOTE OUTPUT can control 4 4 signal and SCANNER can only control 3 signal.



REMOTE OUTPUT

SCANNER

6.2.1 Input Source I/O Signal Control Interface

One 9-pin “D” type connector is mounted on the rear panel that provides 4 I/O signal control. It can control the input power of DUT POWER INPUT terminal through the interface.

6.2.2 Scanner I/O Signal Control Interface

One 25-pin connector is mounted on the rear panel that provides 4 I/O signal control. It can control the HI and LO signal of Probe HI and Probe LO through the interface.

6.3 Bus Remote Interface GPIB / RS-232

This section provides information on the proper use and configuration of bus remote interface. The RS-232 remote interface is standard on 7630 but the GPIB (IEEE-488) interface option can be substituted for the RS-232 interface. Please refer to the Option section of this manual for details on the 7630 options. The RS-232 interface also uses the same command set as the GPIB interface for setting of test parameters. However there are many functions of the GPIB 488.2 interface that are not available through RS-232. The IEEE-488 interface included with 7630 conforms to the requirements of the IEEE-488.2 standard.

6.2.1 GPIB Messages

There are typically two types of messages that GPIB devices use to communicate with other interconnected GPIB devices;

Interface messages: Often called commands or command messages and Device dependent messages often called data or data messages.

Data Messages: Contain information such as programming instructions or measurement results. Command Messages perform functions such as initializing the bus and addressing and unaddressing devices.

6.2.2 Functions

A GPIB device can be a Listener, Talker and/or Controller. A Talker sends data messages to one or more Listeners, which receive data. A Controller manages the information flow on the GPIB by sending commands to all devices. The GPIB bus is much like a computer bus except a computer has circuit cards connected via a backplane and the GPIB has stand-alone devices connected via a cable.

6.2.3 Signals and Lines

The GPIB consists of 16 signal lines and 8 ground-return or shield drain lines. The 16 signal lines are grouped into 8 data lines, 3 handshake lines and 5 interface management lines.

Data Lines: The eight data lines, DI01 through DI08 carry data and command messages. The 7-bit ASCII or ISO code set is used and the eighth bit DI08 is unused.
Handshake Lines: The transfer of message bytes between devices is done via three asynchronously control lines. Referred to as three-wire interlocked handshake. This guarantees that message bytes on the data lines are sent and received without transmission error.

NRFD (not ready for data) indicates when a device is ready or not ready to receive a message byte.
NDAC (not data accepted) indicates when a device has or has not accepted a message byte.

DAV (data valid) tells when the signals on the data lines are stable (valid) and can be accepted safely by devices.

Interface Management Lines: Five lines are used to manage the flow of information across the interface.

ATN (attention) ATN is driven true by the controller when it uses the data lines to send commands, and drivers ATN false when a Talker can send data messages.

IFC (interface clear) IFC is driven by the system controller to initialize the bus and become CIC.

REN (remote enable) The REN line is driven by the controller that is used to place devices in remote or local program mode.

SRQ (service request) The SRQ line can be driven by any device to asynchronously request service from the Controller.

EOI (end or identify) This line has two purposes- the Talker uses this line to mark the end of a message string, and the Controller uses it to tell devices to identify their response in a parallel poll.

6.2.4 GPIB Connector

Connection is usually accomplished with a 24-conductor cable with a plug on one end and a connector at the other end. Devices may be connected in a linear, star or a combination configuration.

The standard connector is the Amphenol or Cinch Series 57 Microribbon or AMP CHAMP type. The GPIB uses negative logic with standard transistor-transistor logic (TTL) levels. When DAV is true, for example, it is a TTL low level (≤ 0/8 V), and when DAV is false, it is a TTL high level (≥ 2.0 V).

Restrictions and Limitations on the GPIB

A maximum separation of 4 m between any two devices and an average separation of 2 m over the entire bus. A maximum total cable length of 20 m.
No more than 15 device loads connected to each bus, with no less than two-thirds powered on.
For example 1 GPIB controller and a maximum of 14 GPIB instruments.

Note: A bus extender, which is available from numerous manufacturers, is available to overcome these limitations.

6.2.5 GPIB Address

This interface is optional on the 7630. Each device on the GPIB (IEEE-488) interface must have a unique address. You can set the address of the 7630 to any value between 0 and 30. The address is set to 9 when the instrument is shipped from the factory. The address can only be set from the front panel. The address is stored in non-volatile memory and does not change when the power has been off or after a remote reset.

6.2.6 Interface Functions

The capability of a device connected to the bus is specified by its interface functions. These functions provide the means for a device to receive, process, and send messages over the bus. The interface functions are listed in the chart below.

GPIB 488.1 INTERFACE FUNCTIONS

Interface Function	Subset	Description
Source Handshake	SH1	Complete Source handshake capability
Acceptor Handshake	AH1	Complete Acceptor handshake capability
Talker	T6	Talker functions (unaddress if MLA)
Listener	L4	Listener functions (unaddress if MTA)
Service Request	SR1	Complete Service request capability

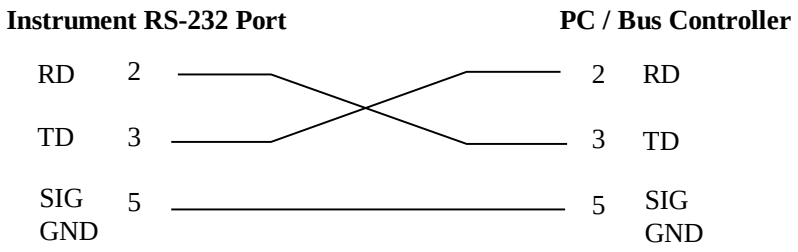
Remote Local	RL0	No remote/local capability
Parallel Poll	PP0	No parallel poll capability
Device Clear	DC1	Complete Device clear capability
Device Trigger	DT0	No device trigger capability
Controller	C0	No controller capability
Electrical Interface	E2	Three-state drivers

Controllable Items	Test and Reset control. Setting of test parameters for tests. Reading of instrument status and test results.
Data Codes	ASCII
Delimiter	NL (+ EOI)

6.2.7 RS-232 Interface

This interface is standard on 7630. This interface provides all of the control commands and parameter setting commands of the GPIB interface with the exception of the 488.2 Common Command the Status Reporting commands and SRQ capability. The identification command *IDN is also available through RS-232.

The RS-232 cabling should be configured as follows for a 9 pin serial port interface:



The COM port should have the following configuration. 9600 baud, 8 data bits, 1 stop bit, no parity. This interface does not support XON/XOFF protocol or any hardware handshaking. The controller should be configured to ignore the handshaking lines DTR (pin 4), DSR (pin 6) CTS (pin 8) and RTS (pin 7). If the port can not be configured through software to ignore the lines then the handshake lines should be jumpered together in two different sets. Pins 4 and 6 jumpered together and pins 7 and 8 jumpered together at the controller end of the cable.

When sending command over the RS232 bus the instrument will send a response string of 06 hex or 6 decimal, the Acknowledge (ACK) ASCII control code if the transfer was recognized and completed by the instrument. If there is an error with the command string that is sent, the

instrument will respond with 15 hex or 21 decimal, the Not Acknowledge (NAK) ASCII control code. The ACK or NAK response allows for software handshaking, to monitor and control data flow. When requesting data from the instrument, it will automatically send the data back to the controller input buffer. The controller input buffer will accumulate data being sent from the instrument including the ACK and NAK response strings, until it has been read by the controller.

6.2.8 GPIB / RS-232 Interface Command List

A GPIB read command must be sent after the command strings, to retrieve any data from a query command (?). The 7630 GPIB bus will not send any data to the controller without being queried. The RS-232 bus will automatically send any response back to the controller's input buffer. Each command string should be terminated by the ASCII control code, New Line <NL>, OAh or the end of line EOL message for GPIB.

The following conventions are used to describe the commands syntax for 7630. Braces ({ })enclose each parameter for a command string. Triangle brackets (< >) indicate that you must substitute a value for the enclosed parameter. The Pipe (|) is used to separate different parameter options for a command. Do not include any of the above characters when sending the commands. The command and the value should be separated with a space.

All commands that end with a question mark (?) are query commands and required an IEEE-488 read command to retrieve the data from the device's output buffer.

SETTING COMMAND	**DESCRIPTION**	**COMMAND**	RUN	TCT
TEST		TEST	◎	◎
RESET		RESET	◎	◎
HARD COPY	Testing data	TD?	◎	◎
	mode,state,meter1,2,3…		◎	◎
STEP RESULTS nn	nn=Step number,nn=1~30	RD nn?	◎	◎
Result Memory (Memory link enable)	xx=File nn=Step number,xx =1~30,nn min=1~30;	RD xx,nn?	◎	◎
Read Scanner port status?	0=None 1=Internal(X) 2=External 3=Both internal and External(X)	RS?	◎	◎
FILE:LOAD nn	nn=01-50	FL nn	◎	◎
FILE:NEW nn,xxx	nn=01-50,xxx=name	FN nn,xxxx	◎	◎
LIST:FILE NAME?	work file now	LF?	◎	◎
LIST:FILE NAME nn?		LF nn?	◎	◎
FILE:DELETE	work file now	FD	◎	◎
FILE:DELETE nn	nn=01-50	FD nn	◎	◎
FILE:SAVE	work file now (The file number must be bigger than 0.)	FS	◎	◎
FILE:SAVEAS nn,xxx	nn=01-50,xxx=name	FSA nn,xxxx	◎	◎

File memory link enable	Files memory link enable. (Step should be 30 steps, and not last files.)	FME	◎	◎
	Files memory link disable.	FMD	◎	◎
	File Momory state.1=enable 0=disable.	FM?	◎	◎
STEP:SELECT nn	nn=01-30	SS nn	◎	◎
STEP:SELECT?	nn=01-30	SS?	◎	◎
STEP:ADD:RUN	(The file number must be bigger than 0.)	SAR	◎	
STEP:ADD:TCT	(The file number must be bigger than 0.)	SAL		◎
STEP:DELETE	work STEP now	SD	◎	◎
STEP:DELETE nn	nn=01-30	SD nn	◎	◎
STEP:PROMPT	clr prompt	SP	◎	◎
STEP:PROMPT xxxxxx	xxxx=word	SP xxxxx	◎	◎
LIST:PROMPT?	work STEP now	LP?	◎	◎
LIST:PROMPT nn?		LP nn?	◎	◎
LIST:STEP?	work STEP now	LS?	◎	◎
LIST:STEP nn?		LS nn?	◎	◎
Example: 1,RUN,600.0,0.0,10.00,0.00,0.5,0.5,0.00,0.00,1000,00,1.000,0.000,ON State :STEP number,Type,Voltage-HI,Voltage-LO,Amp-HI,Amp-LO,Delay,Dwell,Leakage-HI, Leakage-LO,Power-HI,Power-LO,PF-HI,PF-LO,Continuous,Mn			◎	
Example:1,LLT,10000,0.0,125.0,0.0,99.0,2.5,CLOSED,OFF,OPEN,UL544NP,Probe-HI To Probe-LO,RMS,OFF,MANUAL,AC,OFF State :STEP number,Type,Leakage-HI,Leakage-LO,Voltage-HI,Voltage-LO,Delay,Dwell,(offset,) Neutral,Reverse,Ground,Meas.Device,Probe,Peak-RMS,Extended meter,Ranging mode,AD/DC,Continuous,Mn,Scanner				◎
STEP:EDIT:DWELL nnn.n	0.0~999.9s	EDW nnn.n	◎	◎
EDIT:DWELL?	S	EDW?	◎	◎
STEP:EDIT:DELAY nnn.n	0.0~999.9s	EDE nnn.n	◎	◎
EDIT:DELAY?	S	EDE?	◎	◎
STEP:EDIT:Leakage OFFSET nnnn	0~999.9uA	ELO nnn.n		◎
EDIT:OFFSET?		ELO?		◎
STEP:Automatic offset setting.	0~999.9uA	SAO		◎
STEP:EDIT:SCANNER-HLO xxxxx	xxxxxxxx=H,L,O	ES xxxxxxxxxxx		◎
EDIT:SCANNER-HLO?	X	ES?		◎
ADD all paramters for one STEP	(The file number must be bigger than 0.)	ADD n,p,p,p,p…	◎	◎
ADD RUN,Voltage-HI,Voltage-LO,Amp-HI,Amp-LO,Delay,Dwell,Leakage-HI,Leakage-LO, Power-HI,Power-LO,PF-HI,PF-LO,Continuous,Mn			◎	
ADD LLT,Leakage-HI,Leakage-LO,Voltage-HI,Voltage-LO,Delay,Dwell,(offset,)Neutral,Reverse,Ground, Meas.Device,Probe,Peak-RMS,Continuous,Extended meter,Ranging mode,AD/DCMn,Scanner,				◎
READ:RESET?	1=OPEN,0=CLOSE	RR?	◎	◎
READ:INTERLOCK?	1=OPEN,0=CLOSE	RI?	◎	◎
STEP:EDIT:VOLTAGE-HI nnnn	0.0~277.0V	EVH nnnn	◎	◎

EDIT:VOLTAGE-HI?	V	EVH?	◎	◎
STEP:EDIT:VOLTAGE-LO nnnn	0.0~277.0V	EVL nnnn	◎	◎
EDIT:VOLTAGE-LO?	V	EVL?	◎	◎
STEP:EDIT:CURRENT-HI nnnn	0.00~40.00A	ECH nnnn	◎	
EDIT:CURRENT-HI?	A	ECH?	◎	
STEP:EDIT:CURRENT-LO nnnn	0.00~40.00A	ECL nnnn	◎	
EDIT:CURRENT-LO?	A	ECL?	◎	
EDIT:PF-LO n	1	EPFLnnnn	◎	
EDIT:PF-LO?	X	EPFL?	◎	
STEP:EDIT:REVERSE n	n=0~2,1=on,0=off,2=auto	ER n		◎
EDIT:REVERSE?	X	ER?		◎
STEP:EDIT:CONTINUOUS n	N=0~1, 0=off, 1=on	ETCN n	◎	◎
EDIT:CONTINUOUS?	1/0	ECTN?	◎	◎
STEP:EDIT:PROBE n	n=0,1,2,3,4	EP n		◎
EP 0=Ground To Line, EP 1=Probe-HI To Line EP, 2=Probe-HI To Probe-LO, 3= Ground To Neutral, 4=Auto				◎
EDIT:PROBE?	X	EP?		◎
STEP:EDIT:NEURAL n	n=0,1 open=1,close=0	EN n		◎
EDIT:NEURAL?	X	EN?		◎
STEP:EDIT:GROUND n	n=0,1 open=1,close=0	EG n		◎
EDIT:GROUND?	X	EG?		◎
STEP:EDIT:MEAS-DEVICE n	n=0~9	EM n		◎
EDIT:MEAS-DEVICE?	0=UL544NP	EM?		◎
EM 0=UL544NP				◎
EM 1=UL544P				◎*1
EM 2=IEC601-1,UL2601-1				◎
EM 3=UL1563				◎*1
EM 4=IEC60990 Fig4,U2 IEC60950				◎
EM 5=IEC60990 Fig4,U1 IEC60950				◎
EM 6=IEC60990 Fig5,U3				◎
EM 7=IEC60990 Fig5,U1				◎
EM 8=External				◎
EM 9=Frequency Check				◎
EDIT:PLC MEM n	n=1~7	EPM n	◎	◎

1: Recall Memory1 for AC Source; 0.8 times for 1931S 2: Recall Memory2 for AC Source; 0.85 times for 1931S 3: Recall Memory3 for AC Source; 0.9 times for 1931S 4: Recall Memory4 for AC Source; 1 times for 1931S and 1931 5: Recall Memory5 for AC Source; 1.06 times for 1931S and 1931 6: Recall Memory6 for AC Source; 1.1 times for 1931S and 1931 7: Recall Memory7 for AC Source				
EDIT:PLC MEM?		EPM?	◎	◎
STEP:EDIT:LEAKAGE-HI nnnn	0.000~10.00(RUN unit mA /TCT uA)	ELH nnnnn	◎	◎
EDIT:LEAKAGE-HI?	mA	ELH?	◎	
STEP:EDIT:LEAKAGE-LO nnnn	0.000~10.00(RUN unit mA /TCT uA)	ELL nnnnn	◎	◎
EDIT:LEAKAGE-LO?	mA	ELL?	◎	
STEP:EDIT:POWER-HI nnnn	0~10000W	EPOH nnnnn	◎	
EDIT:POWER-HI?	W	EPOH?	◎	
STEP:EDIT:POWER-LO nnnn	0~10000W	EPOL nnnnn	◎	
EDIT:POWER-LO?	W	EPOL?	◎	
STEP:EDIT:PF-HI nnnn	0.000~1.000	EPFH nnnn	◎	
EDIT:PF-HI?	X	EPFH?	◎	
STEP:EDIT:PF-LO nnnn	0.000~1.000	EPFL nnnn	◎	
EDIT:PF-LO?	X	EPFL?	◎	
Edit:Leakage Mode n	1=Peak,0=RMS	ELM n		◎
Edit:Leakage Mode?		ELM?		◎
STEP:Edit:AC/DC	0=ACDC,1=AC, 2=DC	EACDC		◎
Edit:AC/DC		EACDC?		◎
STEP-EDIT Extended meter	0: OFF 1:ON	EEM		◎
EDIT Extended meter?	0: OFF 1:ON	EEM?		◎
STEP-EDIT Ranging mode	0: Manual 1:Auto	ERM		◎
EDIT Ranging mode?	0: Manual 1:Auto	ERM?		◎
STEP:TOTAL;?		ST?	◎	◎
FILE:TOTAL;?		FT?	◎	◎
System:PLC:Remote n	1=on,0=off	SPR n	◎	◎
System:PLC:Remote?		SPR?	◎	◎
System:SINGLE:STEP n	1=on,0=off	SSI n	◎	◎
System:SINGLE:STEP?		SSI?	◎	◎
System:FAIL:STOP n	1=on,0=off	SF n	◎	◎
System:FAIL:STOP?		SF?	◎	◎
System:Alarm n	n=0-9	SAL n	◎	◎
System:Alarm?		SAL?	◎	◎
System:Contrast n	n=1-9	SC n	◎	◎
System:Contrast ?		SC?	◎	◎
System:Security n (System:Lock n)	1=on,0=off	SL n	◎	◎
System:Security? (System:Lock?)	X	SL?	◎	◎
System:File Recall n(System:Mem:Lock n)	1=on,0=off	SML n	◎	◎
System:File Recall?(System:Mem:Lock?)	X	SML?	◎	◎
System:Cal:Alert n	1=on,0=off	SCA n	◎	◎
System:Cal:Alert?	X	SCA?	◎	◎
System:Date:Format n	0=ymd,1=mdy,2=dmy	SDF n	◎	◎
System:Date:Format?	X	SDF?	◎	◎

System:Cal:Date mm,dd,yy or yy,mm,dd	Date Format by SDF	SCDA mm,dd,yy	◎	◎
System:Cal:Date?	Date Format by SDF	SCDA?	◎	◎
System:Cal:Due mm,dd,yy or yy,mm,dd	Date Format by SDF	SCDU mm,dd,yy	◎	◎
System:Cal:Due?	Date Format by SDF	SCDU?	◎	◎
System:Alert:Date mm,dd,yy or yy,mm,dd	Date Format by SDF	SA mm,dd,yy	◎	◎
System:Alert:Date?	Date Format by SDF	SA?	◎	◎
System:Date mm,dd,yy or yy,mm,dd	Date Format by SDF	SDT mm,dd,yy (U3 SD mm,dd,yy)	◎	◎
System:Date?	Date Format by SDF	SDT? (U3 SD?)	◎	◎
System:Time:Format n	0=12hr, 1=24hr	STF n	◎	◎
System:Time:Format?		STF?	◎	◎
System:Time hh:mm	Time Format by STF	STM hh,mm (U3 ST hh,mm)	◎	◎
System:Time?	Time Format by STF	STM?	◎	◎
System:Day n	0=Sunday,…3=Wednesday,..6=Saturday	SDAY n	◎	◎
System:Day?		SDAY?	◎	◎
System:Verification n	1=on,0=off	SV n	◎	◎
System:Verification?		SV?	◎	◎
System:Omnia Info n	1=Pause,0=Continue	SOI n	◎	◎
System:Omnia Info?		SOI?	◎	◎
System:Main Menu n	1=on,0=off	SMM n	◎	◎
System:Main Menu n		SMM?	◎	◎

*1 This function will not be existence if option OPT.754 High Measurement Range 35mArms / 70mApeak & 4MDs.

6.3 IEEE 488.2 Common Commands

These commands are required by the IEEE-488.2 standard with the exception of *PSC, *PSC?. Most of these commands are not available over the RS-232 bus except for the *IDN? command which can be used to retrieve the instrument identification information, and the four status reporting commands *ESR?, *ESE, *ESE? and *STB?.

Command	Name	Description
*IDN?	Identification Query	eec, Model Number, Serial Number, Firmware Revision
*RST	Reset Command	Resets 7630
*TST?	Self-Test Query	00H=OK 01H=TEST EEPROM ERROR
*CLS	Clear Status Command	Clear Standard Event Status Register Clear Service Request Register
*OPC	Operation Complete Command	When TEST command ok setting ESR BIT0 =1
*OPC?	Operation Complete Query	1 = TEST completed ok 0 = TEST in process
*WAI	Wait-to-Continue Command	

*PSC {1|0}	Power-on Status Clear Command	1 = Power-on clear enable registers 0 = Power-on load previous enable registers
*PSC?	Power-on Status Clear Query	
*ESR?	Standard Event Status Register Query	0 - 255
*ESE <*value*>	Standard Event Status Enable Command	*value* = 0 - 255
*ESE?	Standard Event Status Enable Query	0 - 255
*STB?	Read Status Byte Query	Read Status Byte
*SRE <*value*>	Service Request Enable Command	*value* = 0 - 255
*SRE?	Service Request Enable Query	0 - 255

***IDN?**

Read the instrument identification string. Company =eec.

***RST**

Reset the instrument to original power on configuration. Does not clear Enable register for Standard Summary Status or Standard Event Registers. Does not clear the output queue. Does not clear the power-on-status-clear flag.

***TST?**

Performs a self test of the instrument data memory. Returns 0 if it is successful or 1 if the test fails.

***CLS**

Clears the Status Byte summary register and event registers. Does not clear the Enable registers.

***OPC**

Sets the operation complete bit (bit 0) in the Standard Event register after a command is completed successfully.

***OPC?**

Returns an ASCII "1" after the command is executed.

***WAI**

After the command is executed, it prevents the instrument from executing any further query or commands until the no-operation-pending flag is TRUE.

***PSC {1|0}**

Sets the power-on status clear bit. When set to 1 the Standard Event Enable register and Status Byte Enable registers will be cleared when power is turned ON. 0 setting indicates the Enable registers will be loaded with Enable register masks from non-volatile memory at power ON.

***PSC?**
Queries the power-on status clear setting. Returns 0 or 1.

***ESR?**
Queries the Standard Event register. Returns the decimal value of the binary-weighted sum of bits.

***ESE <*value*>**
Standard Event enable register controls which bits will be logically ORed together to generate the Event Summary bit 5 (ESB) within the Status Byte.

***ESE?**
Queries the Standard Event enable register. Returns the decimal value of the binary-weighted sum of bits.

***STB?**
Read the Status Byte. Returns the decimal value of the binary-weighted sum of bits.
***SRE <*value*>**
Service Request enable register controls which bits from the Status Byte should be use to generate a service request when the bit value = 1.

***SRE?**
Queries the Service Request enable register. Returns the decimal value of binary-weighted sum of bits.

6.3.1 Status Reporting

Status reporting system is configured using two types of registers. An Event Register and a Summary register. The summary register is known as the Status Byte register and records high-level summary information acquired by the event registers.

An Event register report defined conditions or messages at each bit. The bits are latched and remain at an active state until the register is either Read or Cleared. Reading the event register automatically clears the register and sets all bits to inactive state or 0. When querying an event register the information is returned as a decimal number representing the binary-weighted sum of all bits within the register.

The Enable registers bits represent the selection of bits that will be logically-ORed together to form the summary bit in the status byte. The *CLS command will not clear the enable registers and if you wish to clear the register you must set it to a value of 0. Like the event register, the enable register is represented as a decimal number that equals the binary-weighted sum of all bits.

The enable register will clear to value of 0 at power up unless the *PSC 0 command had been

executed before power-off. The *PSC command tells the device whether or not it should clear the enable registers at power-on. Using this command will allow SQRs to function immediately after power-on.

		Standard Event Register		Status Byte Register	
Bit	Binary weigh t	Event Register	Enable Register	Summary Register	Enable Register
0	1	Operation Complete		ALL PASS	
1	2	not used		FAIL	
2	4	Query Error		ABORT	
3	8	Device Error		TEST IN PROCESS	
4	16	Execution Error		Message Available (MAV)	
5	32	Command Error		Event Summary Bit (ESB)	
6	64	not used		Request Service (RQS) or Master Summary Status (MSS)	not used
7	128	Power On		PROMPT	
		*ESR?	*ESE *ESE?	*STB? | SPOLL	*SRE *SRE?

6.4 Non Volatile Memory

The instrument saves each parameter in non-volatile memory when the file save "FS" command is used to save the file. The non-volatile memory has a limited write cycle life, therefore for programmers who wish to send all parameters before executing each test the "FS" command should not be used. The parameters will be stored in the CPU's Random Access Memory (RAM) until another memory location is selected. However, settings written to RAM from GPIB/RS-232 mode will be lost when power is shut down. Parameter changes to RAM are unlimited and will not effect the life of the internal non-volatile memory chip.

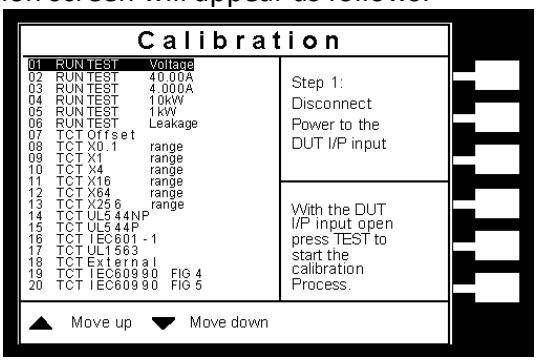
7. CALIBRATION

This instrument has been fully calibrated at the factory in accordance to our published specifications. It has been calibrated with standards traceable to CNLA. You will find in this manual a copy of the "Certificate of Calibration". It is recommended that you have this instrument re-calibrated and a safety check done at least once per year. eec recommends you use "Calibration Standards" that are NIST traceable, or traceable to agencies recognized by NIST to keep this instrument within published specifications.

End user metrology standards or practices may vary. These metrology standards determine the measurement uncertainty ratio of the calibration standards being used. Calibration adjustments can only be made in the Calibration mode and calibration checks or verifications can only be made while operating in Test mode.

7.1 Calibration Initialization

Press and hold the calibration key on the rear panel with a pen, pencil, or small screwdriver while powering ON the 7630. The 7630 enters calibration mode after the power on sequence is complete. The Initial Calibration screen will appear as follows:



The Calibration screen is separated into three sections. The left half of the screen lists all of the calibration points necessary for an accurate calibration of the instrument. The right half of the screen is split into two smaller screens. The upper right section of the screen displays meter and load information required to perform the selected calibration. The lower right section of the screen contains prompts that will help guide you through the calibration process.

7.1.1 Selecting Specific Calibration points

When the calibration is initialized, the first calibration point is automatically selected. The calibration is set up so that as each calibration point is completed the highlighted area will automatically scroll to the next calibration point.

To manually select calibration points, use the up and down arrows to scroll the highlighted area to the desired calibration point. The load/meter screen and prompt screens will automatically update

for the calibration point selected.

7.1.2 Calibration points

Each calibration point requires different loads, standards and process. As each point is selected, the load/meter screen and prompt screens will display the meter, load and process information required to complete the calibration process for the selected point.

1. RUN TEST Voltage：Calibration of Run Test Voltage

Disconnect power to the DUT I/P input first. With the DUT I/P input open, press TEST to start the Offset calibration process.

Connect 110VAC and a standard voltmeter to the DUT I/P input, then press the TEST button to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

2. RUN TEST 40.00A：Calibration of Run Test Current 40.00A

Set DUT I/P 120-277VAC. Connect a 40Amp load at DUT output in series with current meter. When the load is connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

3. RUN TEST 4.000A：Calibration of Run Test Current 4.000A

Set DUT I/P 120-277VAC. Connect a 4Amp load at DUT output in series with current meter. When the load is connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

4. RUN TEST 10kW：Calibration of Run Test Power 10kW

Set DUT I/P voltage to 220VAC and connect a 5 ohm load. Connect power meter in series with the DUT. When the load is connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

5. RUN TEST 1kW：Calibration of Run Test Power 1kW

Set DUT I/P voltage to 220VAC and connect a 60 ohm load. Connect power meter in series with the DUT. When the load is connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

6. RUN TEST Leakage：Calibration of Run Test Leakage

Connect 18 VAC to the DUT I/P input. Connect a standard current meter to the DUT outputs from L to G. When the power supply and meter are connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

7. TCT Offset：Calibration of Touch Current Test Offset

Disconnect all the leads. When the leads are opened, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

8.TCT × 0.1 range：Calibration of Touch Current Test Volts × 0.1

Connect 30.0VDC and a voltmeter to Probe-HI + and Probe-LO -. When the power supply and meter are connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

9.TCT × 1 range：Calibration of Touch Current Test Volts × 1

Connect 8.0VDC and a voltmeter to Probe-HI + and Probe-LO -. When the power supply and meter are connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.TCT × 4 range：Calibration of Touch Current Test Volts × 4

Connect 2.0VDC and a voltmeter to Probe-HI + and Probe-LO -. When the power supply and meter are connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

11.TCT × 16 range：Calibration of Touch Current Test Volts × 16

Connect 0.5VDC and a voltmeter to Probe-HI + and Probe-LO -. When the power supply and meter are connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

12.TCT × 64 range：Calibration of Touch Current Test Volts × 64

Connect 0.125VDC and a voltmeter to Probe-HI + and Probe-LO -. When the power supply and meter are connected, press TEST to activate the calibration. Read the measurement from your

standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

13.TCT × 256 range：Calibration of Touch Current Test Volts × 256

Connect 0.032VDC and a voltmeter to Probe-HI + and Probe-LO -. When the power supply and meter are connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

14. TCT UL544NP：Calibration of Touch Current Test MD: UL 544NP measuring device

Connect 2.2VDC in series with a current meter to Probe-HI + and Probe-LO -. When the power supply and meter are connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

15. TCT UL544P：Calibration of Touch Current Test MD: UL 544P measuring device

Connect 2.2VDC in series with a current meter to Probe-HI + and Probe-LO -. When the power supply and meter are connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

16. TCT IEC601-1：Calibration of Touch Current Test MD: IEC601-1 measuring device

Connect 2.2VDC in series with a current meter to Probe-HI + and Probe-LO -. When the power supply and meter are connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

17.UL 1563：Calibration of Touch Current Test MD: UL 1563 measuring device

Connect 2.2VDC in series with a current meter to Probe-HI + and Probe-LO -. When the power supply and meter are connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

18.TCT External：Calibration of Touch Current Test MD: External measuring device

Connect 2.2VDC in series with a current meter to Probe-HI + and Probe-LO -. When the power supply and meter are connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

19.TCT IEC60990 FIG 4：Calibration of Touch Current Test MD: IEC60990 FIG 4 measuring device

Connect 2.2VDC in series with a current meter to Probe-HI + and Probe-LO -. When the power

supply and meter are connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

20.TCT IEC60990 FIG5：Calibration of Touch Current Test MD: IEC60990 FIG 5 measuring device

Connect 2.2VDC in series with a current meter to Probe-HI + and Probe-LO -. When the power supply and meter are connected, press TEST to activate the calibration. Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.