

Operating Instructions



OC-DI Series

Digital Interface Oil Testers

Version 1.0

No. 145896

<i>Title</i>	<i>Digital Interface Oil Testers</i>
<i>Date</i>	<i>06/2018</i>

Revision History

<i>V0.1</i>	<i>03/2018</i>	<i>MC</i>	<i>Initial draft of the document</i>
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WARNING

Before operating the instrument, be sure to read and fully understand the operating instructions. This instrument produces hazardous voltages. It is the responsibility of the user to ensure that the system is operated in a safe manner.



This equipment contains exposed terminals carrying hazardous voltages. There are no user serviceable components in the unit. All repairs and upgrades that require the unit to be opened must be referred to HIPOTRONICS or one of their nominated agents.

HIPOTRONICS and its sales partners refuse to accept any responsibility for consequential or direct damage to persons and/or goods due to the lack of observance of instructions contained herein or due to incorrect use of the equipment.

Further be aware that safety is the responsibility of the user!

Any correspondence regarding this instrument should include the exact type number, instrument serial number and firmware version number. With the exception of the firmware version number, this information can be found on the registration plate on the right panel of the instrument. The firmware version can be found in the bottom right corner of the settings window.

Unauthorized opening of the unit may damage the EMI protection of the system and will reduce its resistance to interference and transients. It may also cause the individual unit to be no longer compliant with the relevant EMC emission and susceptibility requirements. If the unit has been opened, the calibration will be rendered invalid and the warranty will be void.

Note

HIPOTRONICS has a policy of continuing improvement on all their products. The design of this instrument will be subject to review and modification over its life. There may be small discrepancies between the manual and the operation of the instrument, particularly where software has been upgraded in the field.

HIPOTRONICS retains the right to modify the functionality, specification or operation of the instrument without prior notice.

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2018, HIPOTRONICS, USA

Manual Conventions

In the manual, the following conventions are used:



Indicates hazards.

There is a risk of equipment damage or personal injury or death. Carefully read and follow the instructions. Be sure to follow any safety instructions given in addition to those for the site at which tests are being performed.

Foreword

Welcome, new user of the “OC-DI Series”. Thank you for placing your confidence in our product.

With the purchase of this measuring instrument you have opted for all the advantages that have built a world-wide reputation for a HIPOTRONICS Instrument: robustness, performance and quality. As a result, this instrument provides a solution which achieves the optimal combination of traditional know-how and leading edge technology.

This operating manual is designed for completeness and easy location of the required information. Customers who already have experience with this kind of equipment will find this document to be of assistance as an extended help.

If you find a mistake or inconsistency in the operating manual then please feel free to inform our Customer Support department with your corrections so that other users may benefit.

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1 Introduction

1.0 Receiving Instructions

When received, any possible transport damage should be noted. A written record should be made of any damage. A suitable remark should be recorded on the delivery documents.

A claim for damage must be reported immediately to the transport company and to the Customer Support Department of HIPOTRONICS or the local agent. It is essential to retain the damaged packing material until the claim has been settled.

Check the contents of the shipment for completeness immediately after receipt (See chapter “Scope of Supply”). If the shipment is incomplete or damaged, then this must be reported immediately to the transport company and the Customer Support Department of HIPOTRONICS or the local agent. Repair or replacement of the instrument can then be organized immediately.

1.1 General

The OC60-DI Liquid Dielectric Tester accurately and reliably tests dielectric strength of insulating liquids used in a wide variety of electrical apparatus. The rugged, lightweight and portable design ensures years of safe and trouble-free operation both in the field and in the laboratory.

1.2 Scope of Supply

1.2.1 Standard Scope of Supply

The following items are supplied with the standard instrument:

Qty	Description
1	Oil Tester Instrument
1	Power Cord
1	Operation Manual in English
1	Calibration Certificate

1.3 Technical Data: OC60-DI

1.3.1 Physical and Environmental Specifications

Operating temperature	14...122° F (-10 .. 50°C)
Storage temperature	-4...158° F (-20 .. 70°C)
Humidity	5 ... 95 % r.h. non-condensing
Dimensions (W x D x H)	OC60-DI: 16" x 13" x 15" (41cm x 33cm x 38cm)
Weight	OC60-DI: 60lbs (25kg)

1.3.2 Power Specifications

Power Input	90 – 264VAC 50 or 60Hz 200VA
Battery Power	12VDC NiMH 8.4Ah

1.3.3 Measurement

Breakdown Voltages	Accuracy: +/- 2% F.S. Resolution: 0.1kV
Voltmeter	Accuracy: +/- 1% F.S. Resolution: 0.1kV

2 Safety



**Remember:
Hazardous voltage can shock, burn or cause death !**



The unit should only be operated after carefully reading the user manual, which is an integral part of the instrument.

HIPOTRONICS and its sales partners refuse to accept any responsibility for consequential or direct damage to persons and/or goods due to none observance of instructions contained herein or due to incorrect use of the equipment.

Further be aware that Safety is the responsibility of the user!

2.0 General

Safety is the most important aspect when working on or around high voltage electrical equipment.

Personnel whose working responsibilities involve testing and maintenance of the various types of high voltage equipment must have understood the safety rules written in this document and the associated safety practices specified by their company and government. Local and state safety procedures should also be consulted. Company, regional or national regulations must be fulfilled beyond HIPOTRONICS recommendations.

If the instrument is damaged or it is possible that damage has occurred, for example during transportation, do not apply any voltage. The instrument may only be used under dry operating conditions.

Do not open the unit; it contains no user replaceable parts.

People with heart pacemakers should not be in the vicinity of this system during operation.



Safety is the responsibility of the user. Always operate the equipment in accordance with the instructions, always paying full attention to local safety practices and procedures.



This equipment must be operated only by trained and competent personnel who are aware of the dangers and hazards involved in testing transformers.

2.1 Essential Safety Recommendations



Every terminal should be checked and verified before connection of the instrument. Ground connections may be left in place.



Never operate the equipment in an explosive environment or where there are flammable gases or fumes



The instrument must always be connected to a grounded power outlet (i.e. a safety earth). It must never be operated in a non-grounded configuration as this may result in electrical shock to the user or damage to the instrument.

2.2 Summary

Note: Many accidents that happen around high voltage equipment involve personnel who are not familiar, or perhaps too familiar, with high voltage equipment. Staying alert and ever watchful requires constant training and awareness of the inherent hazards. The greatest hazard is the possibility of getting on a live circuit. To avoid this requires constant vigilance - for oneself and for one's fellow workers.

In addition to the obvious dangers, personnel should be alert to recognize subtle dangers as well. Therefore, **all terminals of a device under test, unless grounded, should be considered to be live while the test is in progress.**

Remember: Safety, FIRST, LAST, and ALWAYS !

3 Theory

3.0 Introduction

This model is designed to meet testing specifications from all parts of the world with test cells available for ASTM D877, ASTM D1816 and IEC 156 testing standards. The OC60-DI offers the ability to use one of the pre-programmed rates of voltage rise or allows the operator to create their own tests using Basic mode. An internal kilovoltmeter automatically records the breakdown voltage for each test sample. Each test can be saved into the unit's internal memory or to a USB drive.

3.1 Pre-Installed Test Standards

ASTM D877A	NF EN 60156
ASTM D877B	UNI EN 610156
ASTM D1816	SABS EN 60156
IRAM 2341	PA SEV EN 60156
JIS C 2101 (M) / (S)	CEI EN 60156
AS1767.2.1	BS EN 60156
VDE 0370	IEC 60156

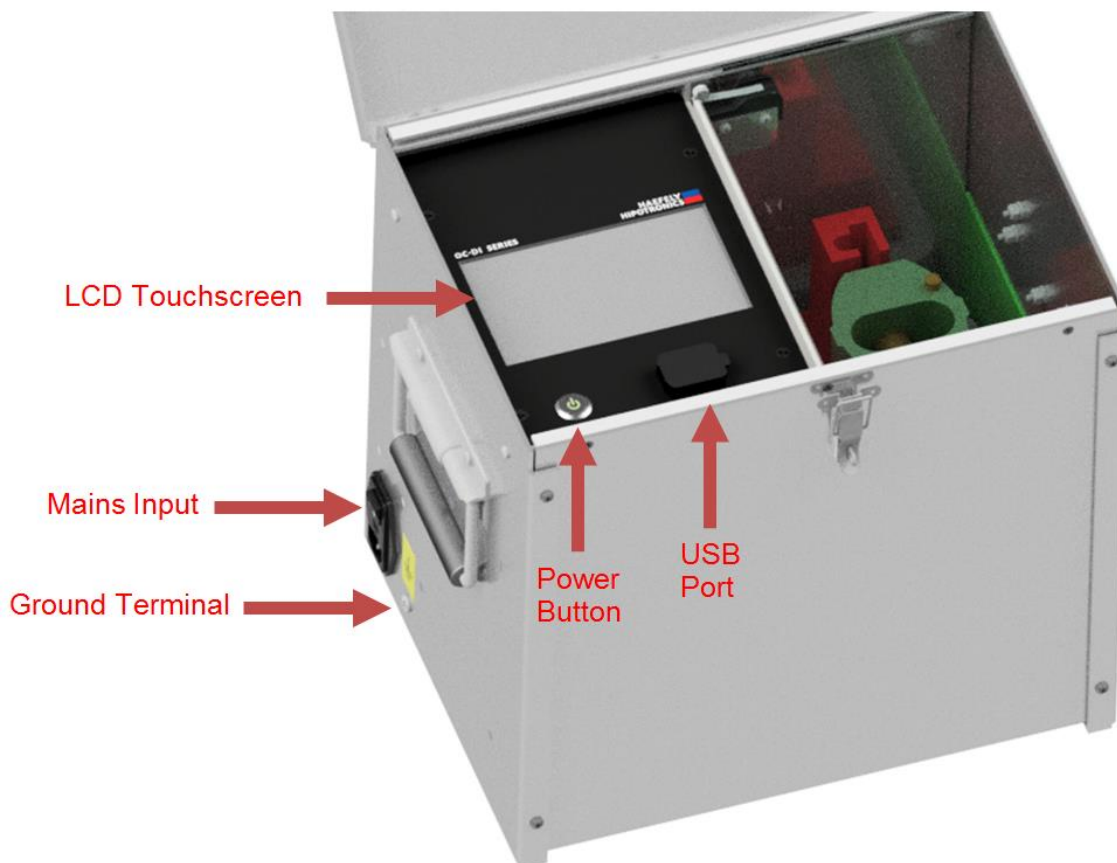
3.2 Application

Testing of insulating dielectric liquid that are used in :

- Transformers
- Bushings
- Switchgear
- Capacitors
- Hydraulics

4 Oil Tester Ports

4.0 Ports



LCD Touchscreen Interface: Use to control software to setup and implement oil tests

Mains Input: Insert power cord to power or recharge unit. When charging, make sure that the input switch is in the 'ON' position

Ground Terminal: Connect chassis to proper ground

Power Button: Turn on/off unit interface. When the unit is on, the power symbol on the button will be lit up green. To turn off the interface, press and hold the power button for a couple of seconds

USB Port: Insert USB drive to export test data

5 Connection and Setup

5.0 Ground Connections

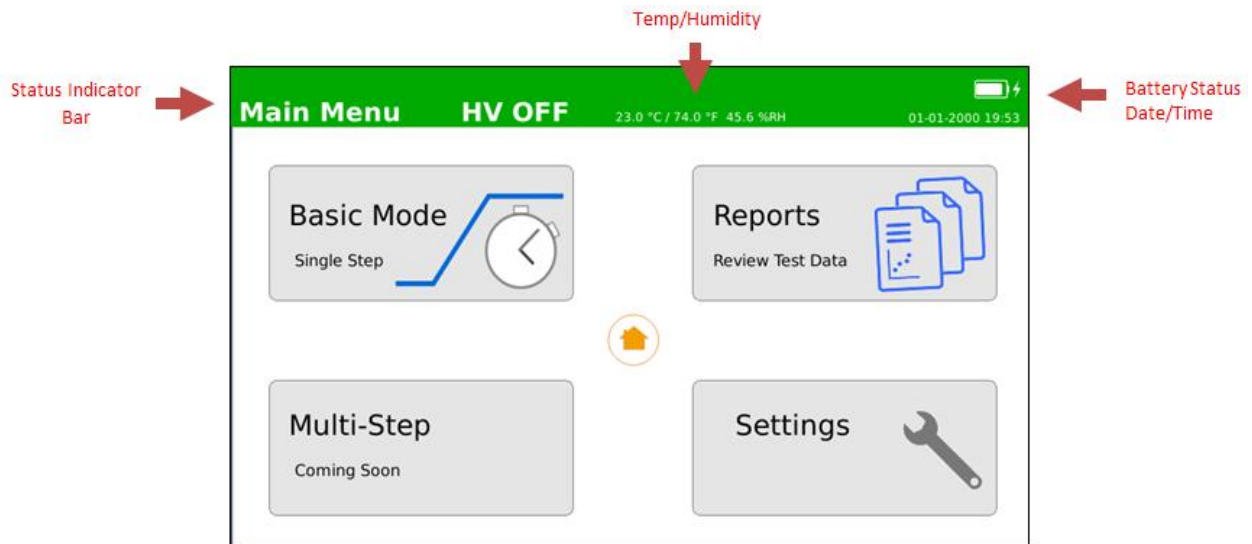
First make sure to connect the unit to a proper ground through the ground screw located on the left side of the oil tester.

5.1 Prepare Oil Test

Make sure the oil cup is properly cleaned twice before each oil sample test to ensure accurate results. Fill the oil cup with the specified amount according to the standard being tested to. Carefully place the oil cup into the slot holders of the transformer inside the test chamber.

6 Operating Modes

6.0 Main Menu



Upon turning the unit on, the interface will load to the Main Menu window. The top bar is the status indicator at all times. It will be green when high voltage is off, and red when high voltage is on. The left corner of the bar will display what window is currently displayed. In the center, the temperature and humidity will be shown; and in the right corner will be the battery level status, and the current date/time.

There are four windows that you can access from the Main Menu window. Basic Mode is the standard automatic oil test that ramps up to a desired voltage until breakdown. Multi-Step is a custom test where the user can program several ramping stages. Reports will allow the user to view and export previously saved tests. Lastly, in the Settings window, the user can configure basic test or system parameters.

6.1 Basic Mode

Standard: IEC 60 156-95

of Tests: 6

Wait Time: 02 : 00

Ramp Rate: 2 kV/s

Dwell Time: 05 : 00

60 kV

2 kV/s

05:00

Test Visual

START

Stir: On | Voltage: 60 kV | Frequency: 50 Hz

Main Menu | Load Standards | Electrode Used

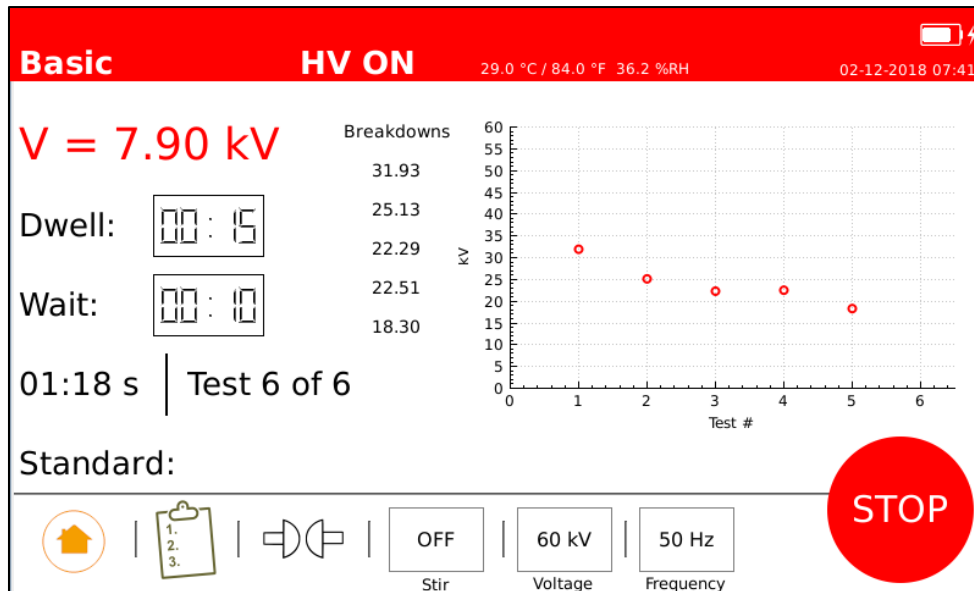
Although Basic Mode is the simple automatic ramping oil test, the user now has the ability to set many different parameters and options to make the test as easy and hands-free as possible.

If testing to a common industry standard, the user can select the clipboard icon to view a list of pre-loaded standards that will automatically populate all of the parameter fields for that test. The right half of the window will show a visual of the test voltage sequence.

To edit the parameters, click on the buttons on the left half of the window or on the bottom bar. The number of tests dictates how many times the unit will ramp up voltage in one test sequence. The ramp rate will set how fast the voltage increases during the test. The wait time is the period between each individual breakdown test, and the dwell time is the period that the voltage will hold at when it reaches its maximum limit without a breakdown occurring.

The OC60-DI also has an Ethernet port in the HV chamber where you can plug in the motor stirrer accessory. This Ethernet port will provide power to the motor stirrer if the stir option is selected, and a test is running. The user can also select the type of electrode being used with the test, for reference that will be saved in the report.

The last two parameter buttons on the right side of the bottom bar will allow the user to select the maximum voltage that the unit will ramp to, up to 60kV; and the output frequency of the high voltage waveform.



After pressing the 'START' button, the chosen test sequence will commence, and a new window will show all of the test parameters. The high voltage will ramp up to the selected target voltage, at the selected ramp rate, and then remain at that voltage for the chosen dwell time. Once the dwell time expires, or a breakdown occurs, the test will shut off high voltage and wait for the selected wait-time before starting a next ramp test, (if they were multiple number of tests selected). The voltage measurement in the top left will show the real-time voltage across the electrodes. The dwell and wait time counters will always be displayed, and will count down when they are active. The total elapsed test time and the current test number are shown in the bottom left.

The right half of the test screen will display the breakdown voltages and graph them on a plot. If the test chamber cover is opened at any time during a test, the high voltage output will shut off and the test will pause until the lid is closed again.

At the conclusion of a test sequence, a small window will pop-up showing a summary of the test, and the user can either save the test data to a report, or press 'Ok' to return to the original basic mode window.

6.2 Multi-Step Mode

Multi-Step HV OFF 26.0 °C / 78.0 °F 43.2 %RH 07-10-2018 20:42

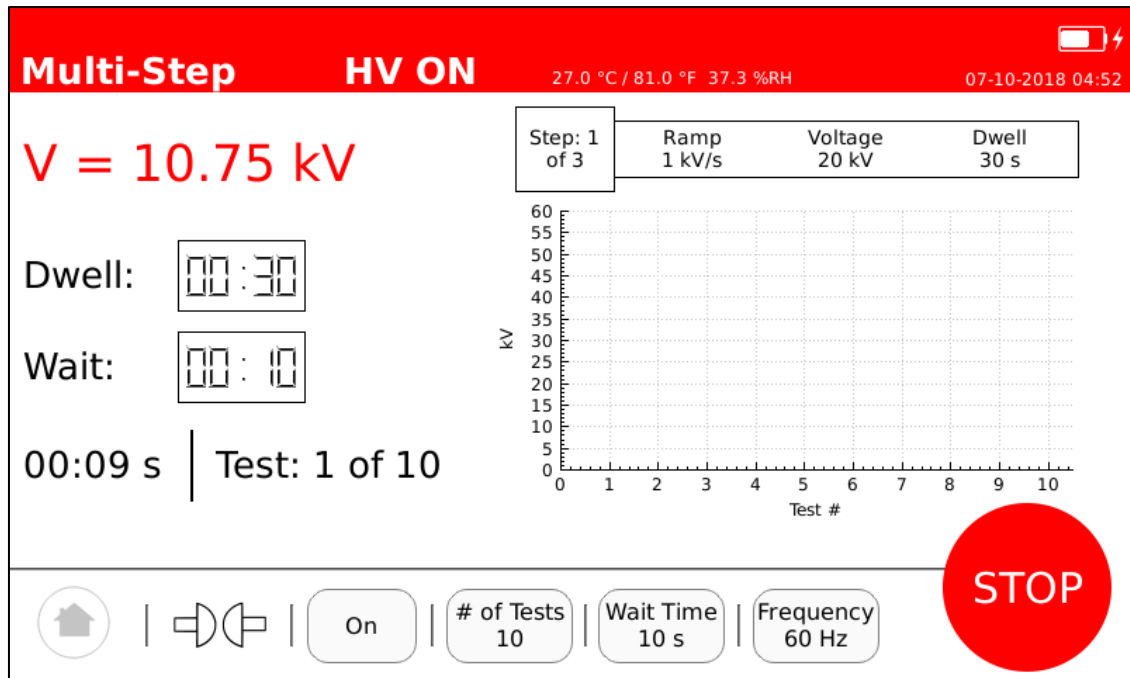
	Ramp	Voltage	Dwell
1	1 kV/s	20 kV	30 s
2	3 kV/s	40 kV	60 s
3	10 kV/s	60 kV	90 s
(x) --	+		

Stir On | # of Tests 10 | Wait Time 10 s | Frequency 60 Hz

START

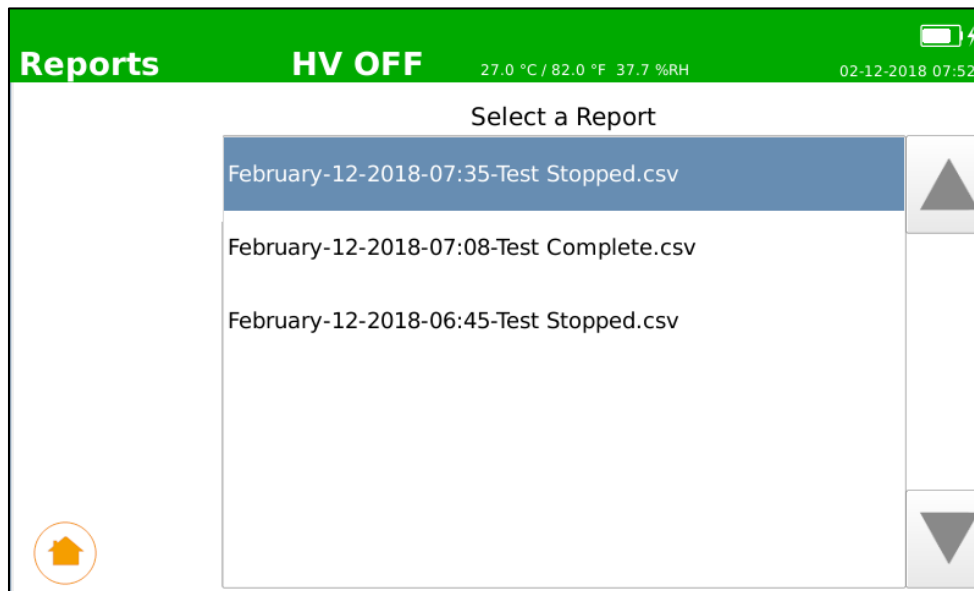
In Multi-Step mode, each test has the capability to customize multiple ramping sequences for unique testing scenarios. By clicking on the cells in the table, the user can select the ramp rate, target voltage, and dwell time for each sequence in the test. To add a step in the test sequence, click the 'plus-sign cell' at the bottom of the table, and then click each cell in the row to select the parameters for that step. To remove the last step in the sequence, click the 'x-button' in the bottom left of the table. The sequence table will only ever show three steps at a time; to view the other steps currently in the test sequence, scroll up or down with the 'arrow keys' to the right of the table.

Similar to Basic Mode, you can adjust other test parameters on the bottom of the screen, such as electrode type, stir option, number of ramp tests to be cycled, the wait time in between tests, and the output frequency. Once, all of these options are selected, begin the test sequence by clicking the 'START button'.

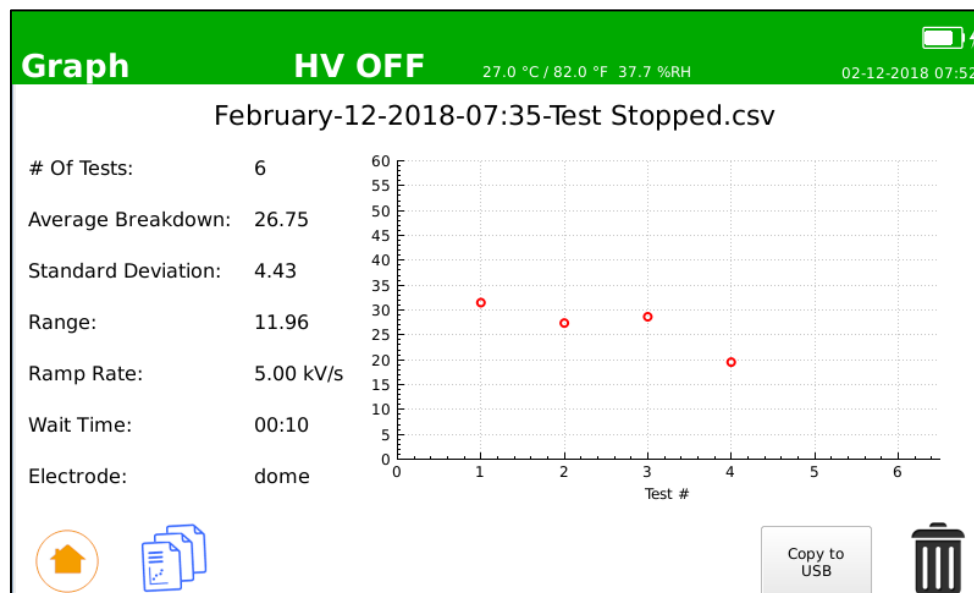


During a test sequence, the left side of the screen will display similar information to Basic Mode (see Section 5.3 for detailed information). The right side of the screen will display all of the breakdowns for the test cycle, and the current step in the sequence. At the start of the test, the voltage will ramp up to the first step's target voltage, at the selected ramp rate, and then dwell at that voltage for the selected dwell time. Once that step's dwell expires, the voltage will start ramping up to the next step's target voltage, at the next step's selected ramp rate, and then proceed to dwell. This will continue until all of the steps in the sequence have been performed, or a breakdown occurs. High voltage will be shut off, and the unit will wait for the chosen wait-time before commencing another test, if multiple number of tests were selected.

6.3 Reports

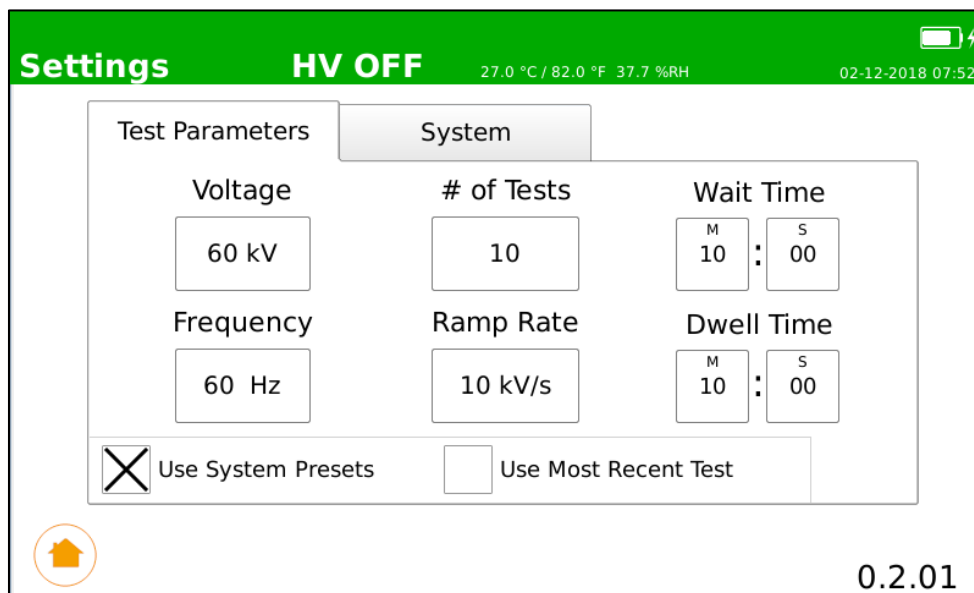


In the Reports window, all of the previously saved test data will be in a report labelled by its date and time of test. Use the touchscreen to select a report to view.

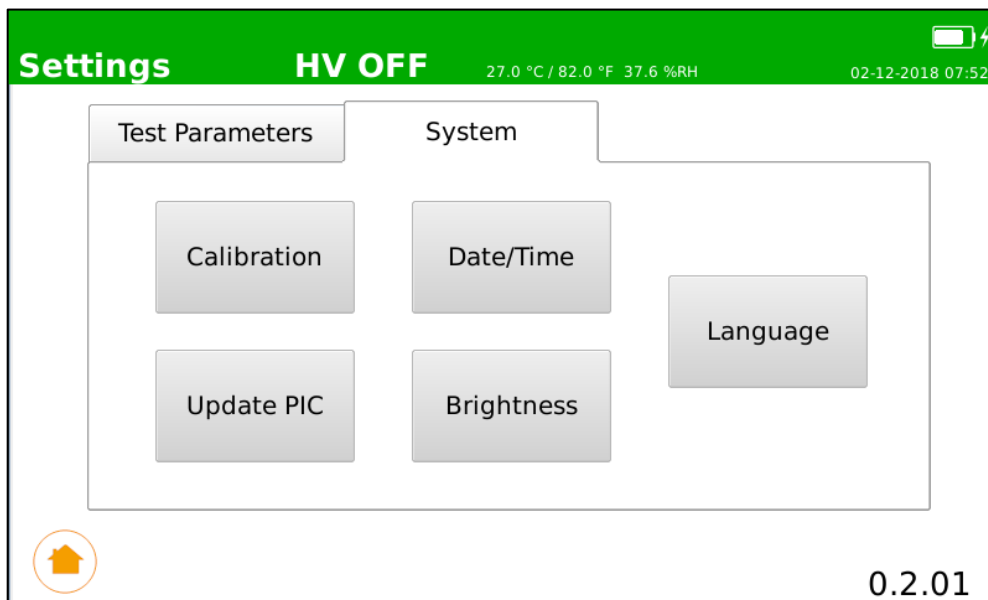


When viewing a report on the unit, several of the chosen test parameters will be displayed, along with the calculated average breakdown voltage, standard deviation of the breakdowns, the breakdown range, and a graph of the breakdowns. The user can also export the test report to a USB drive that is inserted into the unit's USB port, and press the 'Copy to USB' button. The exported report will contain more information, such as each breakdown, the frequency, stir, and temperature/humidity during the test.

6.4 Settings



Under the Settings window, there are two tabs to adjust the default test parameters, or the system's settings. The user can either choose to default load the system presets when the unit is turned on, or use the parameters from the most recently performed test.



The adjustable system parameters include the internal memory's date/time, the touchscreen brightness, and the displayed language. The PIC update are for factory use only.

7 Troubleshooting

7.0 Diagnostics

7.1 Warning and Error Messages

"Low Battery Please Recharge the battery"	The internal battery is low and needs to be recharged via AC Mains. Unit is still able to be operated while charging without any adverse effects.
"Lid Open"	While the lid cover is not over the high voltage chamber, the test will not continue and high voltage is prevented to be present.
Screen Flickering upon start-up	The unit's internal battery is too low and cannot complete the start-up sequence. Please recharge the unit via AC Mains.

8 Miscellaneous

8.0 Care and Maintenance

The Oil Tester instrument is basically service free, as long as the specified environmental conditions are adhered to. As a result, service and maintenance is restricted to cleaning of the equipment and calibration at intervals stipulated by the application for which the instrument is used.

8.0.1 Cleaning the Instrument

The instrument should be cleaned with a lint free cloth, slightly moistened using mild household cleanser, alcohol or spirits. Caustic cleansers and solvents (Trio, Chlorothene, etc.) should definitely be avoided.

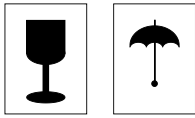
8.0.2 Instrument Calibration

When delivered new from the factory, the instrument is calibrated in accordance with the calibration report provided. A periodic calibration of the instrument every year is recommended.

8.1 Instrument Storage

If the instrument is to remain unused for any length of time, it is recommended to leave the oil tester on trickle charge so that the internal batteries do not completely drain and become unuseable. In addition, it is advisable to protect this high precision instrument from moisture and accumulation of dust and dirt with a suitable covering.

8.2 Packing and Transport



DO NOT SHIP THE UNIT WITH THE OIL TEST CELL INSIDE!

The packing of the oil tester instrument provides satisfactory protection for normal transport conditions. Nevertheless, care should be taken when transporting the instrument. If return of the instrument is necessary, and the original packing crate is no longer available, then packing of an equivalent standard or better should be used.

Whenever possible protect the instrument from mechanical damage during transport with padding. Mark the container with the pictogram symbols "Fragile" and "Protect from moisture".

8.3 Recycling

When the instrument reaches the end of its working life it can, if required, be disassembled and recycled. No special instructions are necessary for dismantling.

The instrument is constructed of metal parts (mostly aluminum) and synthetic materials. The various component parts can be separated and recycled, or disposed of in accordance with the associated local rules and regulations.

Customer Support

All error messages appear on the display of the oil tester measuring instrument. If persistent problems or faulty operation should occur then please contact the Customer Support Department of HIPOTRONICS or your local agent.

The Customer Support Department can be reached at the following address:

HIPOTRONICS
Customer Service
1650 Route 22
Brewster, NY 10509

Tel: +1 (845) 279-3644

E-mail: service@hipotronics.com



We prefer contact via email. Then the case is documented and traceable. Also the time zone problems and occupied telephones do not occur.



Complete information describing the problem clearly helps us to help you:

Failure description

Used settings

DUT type

Firmware Version

Serial Number

Printouts, Pictures



Software Version & Serial No. can be found in “Settings”

Appendix

8.4 Declaration of Conformity

8.5 Hipotronics, Inc.

1650 Route 22 North
PO Box 414
Brewster, NY 10509
USA

Declared, under his own responsibility, that the below mentioned product complies with the requirements of the listed standards or other normative documents.

So, the product complies with the requirements of the EMC directive 2004/108/EC and the low voltage directive 2006/95/EC.

Product: **OC60-DI**

Description: The OC60-DI is a

Standards: EN 61010-1: 2001
EN 61326-1: 2006

Michael Carson
Product Engineering Manager
Hipotronics, Inc.
1650 Route 22 North
Brewster, NY
USA

Brewster, May 25, 2018


.....
(Signature)

8.6 Warranty

HIPOTRONICS, INC. warrants to the original purchaser of any new merchandise that the merchandise is free from defects in materials and workmanship under normal use and service for a period of one (1) year from the date of shipment. The obligation of Hipotronics, Inc. under this warranty is limited, in its exclusive option, to repair, replace or issue credit for parts or materials which prove to be defective, and is subject to Purchaser's compliance with the Hipotronics, Inc. Warranty Claim Procedure as set forth below. The happening of any one or more of the following events will serve to void this warranty and any defect or damage resulting therefrom is specifically excluded from Warranty coverage:

- (a) defects due to accident, negligence, alteration, modification, faulty installation, abuse or misuse by Purchaser or Purchaser's agents or employees.
- (b) attempted or actual dismantling, disassembling, service or repair by any person, firm or corporation not specifically authorized in writing by Hipotronics, Inc.
- (c) defects caused by or due to handling by carrier or incurred during shipment, transshipment or other move.

This Warranty covers only those parts and/or materials deemed by Hipotronics, Inc. to be defective within the meaning of this Warranty. The liability of Hipotronics, Inc. shall be limited to the repair, replacement or issuance of credit for parts deemed defective within the meaning of this Warranty. Costs incurred by purchaser for labor or other expenses incidental to the inspection, repair, replacement or issuance of credit for such parts and/or materials shall be the sole responsibility of purchaser. This Warranty shall not apply to any accessories, parts or materials not manufactured or supplied by Hipotronics, Inc. and if, in the sole discretion of Hipotronics, Inc., Purchaser's claim relates to any materials of a component part, or of the manufacturer of a device of which the defective part is a component, Hipotronics, Inc. reserves the right to disclaim liability under this Warranty and to direct that the Purchaser deal directly with such supplier or manufacturer. Hipotronics, Inc. agrees to assist the purchaser in processing or settling any such claim without prejudicing its position as to liability purchaser in processing or settling any such claim without prejudicing its position as to liability.

Warranty Claim Procedure

Compliance with the following Warranty Claim Procedure is a condition precedent to the obligation of Hipotronics, Inc. under this Warranty.

- (a) Purchaser must notify Hipotronics, Inc. in writing by certified or registered mail, of the defect claimed within twelve (12) months after the date of original shipment. Said notice shall describe in detail the defect, the defective part and the alleged cause of the defect.
- (b) At the exclusive option of Hipotronics, Inc., Purchaser shall dismantle or disassemble at Purchaser's cost and expense and shall ship the defective part or material, prepaid, to Hipotronics, Inc., Brewster, New York 10509, for inspection, or permit an authorized service representative of Hipotronics, Inc. to inspect the defective part or material at the Purchaser's premises. Purchaser shall provide facilities for, and at Purchaser's cost and expense, dismantle, disassemble, or otherwise make accessible the subject part or material whether or not same is a component of, or installed in, a device other than that manufactured or supplied by Hipotronics, Inc. If disclosure shows that the defect is not one for which Hipotronics, Inc. is liable, the Purchaser agrees to reimburse Hipotronics, Inc. for all expense incurred.
- (c) Upon receipt of the defective part or material, or after access to same, Hipotronics, Inc. shall inspect the part or material to determine the validity of Purchaser's claim.

The validity of any Warranty Claim, Purchaser's compliance with Hipotronics, Inc. Warranty Claim Procedure, the obligation to either repair, replace or issue credit, or direct the purchaser to deal directly with a manufacturer or supplier are to be determined solely and exclusively by Hipotronics, Inc. any determination so made shall be final and binding.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED ON THE PART OF HIPOTRONICS, INC., INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE AND CONSEQUENTIAL DAMAGES ARISING FROM ANY BREACH THEREOF AND HIPOTRONICS, INC. NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON, FIRM OR CORPORATION TO ASSUME ANY LIABILITY OR OBLIGATION IN CONNECTION WITH THIS SALE ON ITS BEHALF AND PURCHASER ACKNOWLEDGES THAT NO REPRESENTATIONS EXCEPT THOSE MADE HEREIN HAVE BEEN MADE TO PURCHASER.