

---

# Positron Porcelain Disc Tester

**Model 3782651U / 50 Hz - 60 Hz**

## **User Manual**

## **Description and Operation Guide**



Disclaimer Notice: Although Positron Inc. has made every effort to ensure the accuracy of the information contained herein, this document is subject to change.



---

**CAUTION**

**IMPORTANT SAFETY NOTICE**

**This instrument is intended to be used in high-voltage environments.**

**It should be used ONLY by personnel trained to work in those environments.**

**Although this instrument does not make electrical contact with the high voltages,**

**THIS INSTRUMENT MUST BE USED COUPLED WITH A SUITABLE**

**HIGH DIELECTRIC STRENGTH HOT STICK THAT HAS A VOLTAGE RATING**

**EQUIVALENT TO OR GREATER THAN THE VOLTAGE ON THE DEVICES OR LINES**

**BEING TESTED.**

**NOTE** To be used on AC lines only



## Contents

<b>1.0</b>	<b>General Information .....</b>	<b>3</b>
1.1	Publication Information .....	3
1.2	About this Guide .....	3
1.3	How to use this guide .....	4
1.4	List of Associated References .....	4
<b>2.0</b>	<b>Introduction to the Positron Porcelain Disc Tester .....</b>	<b>7</b>
2.1	Overview .....	7
2.2	General .....	7
2.3	Methodology.....	8
2.4	Porcelain Disc Tester Model Numbers .....	9
<b>3.0</b>	<b>Description of Porcelain Disc Tester Kit.....</b>	<b>13</b>
3.1	The Porcelain Disc Tester Kit .....	13
3.2	Probe Charger .....	14
3.3	Porcelain Disc Tester Hot Stick Attachment.....	14
3.4	Porcelain Disc Tester Pressure Switch Assembly.....	15
<b>4.0</b>	<b>Testing Procedure .....</b>	<b>19</b>
4.1	Switching the Probe On .....	19
4.2	Performing a porcelain insulator string test .....	20
4.3	Result interpretation .....	21
4.4	Usage .....	22
4.5	Important General Notes .....	23
<b>5.0</b>	<b>Specifications.....</b>	<b>26</b>
<b>6.0</b>	<b>Important Information .....</b>	<b>30</b>
6.1	Service and Support .....	30
6.2	Technical Customer Support.....	30
6.3	Customer Training .....	30
6.4	Repair Service.....	30
6.5	Warranty.....	31
6.6	Limitation of Liability.....	31
6.7	Disclaimer Notice .....	32
6.8	Cancellation and Rescheduling Charges.....	32



---

# Chapter 1

## General Information





## 1.0 General Information

### 1.1 Publication Information

© 2024 Positron Inc.

**Positron Porcelain Disc Tester**

#### Description and Operation Guide

User Manual Part #: 950W000170-02E

Publication date: April 2024

#### Published By

Positron Inc.

5101 Buchan Street, suite 220

Montréal, Québec

H4P 2R9 Canada

#### Trademarks

Positron Insulator Tester is a trademark of Positron Inc.

The Insulator Testers are manufactured by Positron Inc. in Montreal, Canada. The Positron Insulator Testers are protected by US patents and copyrights including “METHOD AND APPARATUS FOR THE VERIFICATION OF AN ELECTRICAL INSULATOR DEVICE BASED ON THE ANALYSIS OF THE ELECTRICAL FIELD ALONG THE INSULATOR”.

Product names, other than Positron’s, mentioned herein may be trademarks and/or registered trademarks of their respective companies.

#### Confidentiality Notice

The information contained in this document is the property of Positron Inc. Except as specifically authorized in writing by Positron Inc., the holder of this document:

- 1) shall keep all information contained herein confidential and shall protect same in whole or in part from the disclosure and dissemination to all third parties, and
- 2) shall use same for operating and maintenance purposes only.

### 1.2 About this Guide

This guide introduces and describes the operation of Positron’s Porcelain Disc Tester for Live Line AC high voltage testing of energized porcelain insulator strings. The Positron’s Porcelain Disc Tester is used as a maintenance and safety tool to test and report the presence of leaking discs on a string of porcelain insulators of 6 to 14 discs (115 kV to 230 kV).

### 1.3 How to use this guide



This guide is designed to describe the operational modes of the Positron's Porcelain Disc Tester.

In this document, the term "**disc**" is used to represent a porcelain insulator in a string of 6 to 14 porcelain discs commonly used on lines of approximately 115 kV to 230 kV.

The reader is invited to use the digital (PDF) version of this document to allow searching by keywords. Select **Edit**, then **Find** from the pull-down menu, or press **Ctrl+F** to access the **Find** menu.

### 1.4 List of Associated References

- [1] "Suspension Insulator Puncture Tester"; Report No. ELE 92-62; Bonneville Power Administration Division of Laboratories; December 7, 1992.
- [2] G.H. Vaillancourt, J.P. Bellerive, M. St-Jean, C. Jean, "New Live Line Tester for Porcelain Insulators on High-Voltage Power Line," IEEE Transactions on Power Delivery, Vol. 9, January 1994, pp. 208-219.
- [3] "J.C. Pohlman, C.R. Davis, "Cracked Insulators Create Hazardous Working Conditions During Restoration after Extreme Ice Storms," Proceedings of ESMO-95, Columbus, Ohio, USA, October 29 - November 3, 1995, IEEE Paper 95CH35755.
- [4] A.S. Jagtiani, J.R. Booker, "Aging of Porcelain Insulators Under Mechanical and Electrical Stress on EHV AC Lines," Proceedings of ESMO-95, Columbus, Ohio, USA, October 29 - November 3, 1995, IEEE Paper ESMO 95-CP-08.
- [5] G. H. Vaillancourt, M. Hamel, J. Frate, "Experience with Two Faulty Composite Insulators Detection Methods in Hydro-Quebec," Conference Proceedings of 10<sup>th</sup> International Symposium on High Voltage Engineering, Montreal, Canada, August 25-29, 1997.
- [6] G. H. Vaillancourt, P. Bilodeau, "Diagnostic Testing of Composite Insulators Used on Series Compensation Platforms in Hydro-Quebec," Conference Proceedings of 11<sup>th</sup> International Symposium on High Voltage Engineering, London, England, August 22-27, 1999.
- [7] G. H. Vaillancourt, S. Carignan, C. Jean, "Experience with the detection of faulty composite insulators on High-Voltage power lines by the E-field measurement method," IEEE Transactions on Power Delivery, Vol. 13, No. 2, April 1998, pp 661-666.
- [8] Y.C. Chen, C. R. Li, X. Liang, S. Wang, "The Influence of Water and Pollution on Diagnosing Defective Composite Insulators by E-field Mapping," Conference Proceedings of 11<sup>th</sup> International Symposium on High Voltage Engineering, London, England, August 22-27, 1999.
- [9] D. H. Shaffner, D. L. Ruff, G. H. Vaillancourt, "Experience with a Composite Insulator Testing Instrument based on the Electric Field method" ESMO 2000, Montreal, Canada, October 8-12, 2000.
- [10] L. J. Fernandez, J. M. Munoz, A. Andrés, "Electric field measurement on composite insulators using live working techniques", 5<sup>th</sup> International Conference on Live Maintenance, ICOLIM 2000, Madrid, Spain, May 17-19, 2000.
- [11] I. Gutman (SE), A. Pigini (IT) et al. "Assessment of Composite Insulators by means of Online Diagnosis", CIGRE WG B2.21 2013.
- [12] C. Jean, "High Voltage Insulator Testing based on Electric Field method" 2015 INMR World Congress Conference, Munich, Germany, September 2015.
- [13] C. Jean, "Early Fault Detection on Energized Substation Equipment", 2019 CIGRE Canada Conference, Montréal, September 16-19, 2019.

---

# Chapter 2

## Overview



## 2.0 Introduction to the Positron Porcelain Disc Tester

### 2.1 Overview

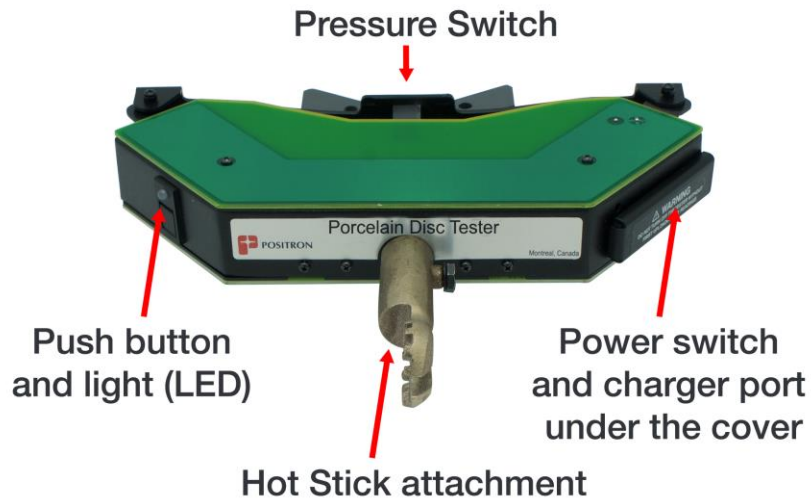


Figure 1: Porcelain Disc Tester  
Model # 3782651U/50: 50Hz  
Model # 3782651U/60: 60Hz

## 2.2 General

The document describes Positron's Porcelain Disc Tester.

The user attaches a non-conductive high dielectric strength hot stick to the Probe's attachment. Readings are taken by applying a pressure near the pin under each disc. The visual and audible alarms on the probe alert the operator.

## 2.3 Methodology

For porcelain suspension insulator strings of 6 to 14 discs, the Porcelain Disc Tester should be used.

The Porcelain Disc Tester is a safe instrument that senses the strength of the Electric Field surrounding the insulator. There is no electrical connection with the metal parts of the disc, making it safe to use.

When a porcelain disc is shorted or leaking, the voltage across this disc is decreased. The Electric field (E-field) around this disc is also decreased. The tester detects this E-field decrease and counts it. When the number of bad discs is equal or higher than 4 defective discs, the light (LED) on the probe flashes in RED and a sound alerts the user immediately of a hazardous condition. If 1 to 3 bad discs are detected, the light flashes in YELLOW. If all discs are normal, the light flashes in GREEN.

The Porcelain Disc Tester processes the data of all discs in its microprocessor and gives the result immediately after the pressure on the pin of the last disc of the string. A data download to a tablet/laptop is not required.

All readings from the testing of all insulator strings are stored in the memory of the tester to optionally allow further engineering investigations when back at the office.

## 2.4 Porcelain Disc Tester Model Numbers

For ordering information, contact Positron Customer Support:

North America: 1-888-577-5254, Option 9, Option 1

International: 001-514-345-2220, Option 9, Option 1

### Testers and Model Numbers

Item Description	Model Number
Porcelain Disc Tester, 60 Hz	3782651U/60
Porcelain Disc Tester, 50 Hz	3782651U/50
220 Vac/120 Vac charger replacement	378126
Rechargeable battery pack replacement for the Probe	378127
12 Vdc auxiliary automotive power charger replacement	378128
Replacement cover plate for Probe power switch	378613





---

# Chapter 3

## Porcelain Disc Tester Elements



### 3.0 Description of Porcelain Disc Tester Kit

#### 3.1 The Porcelain Disc Tester Kit

The Porcelain Disc Tester kit consists of:

- A rugged carrying case,
- A Pressure Switch Actuator Assembly,
- A 12Vdc auxiliary automotive power charger,
- A Porcelain Disc Tester Electric Field Probe,
- Spare switch cover,
- User manual in print,
- Replacement screws and screwdriver,
- Plug-in wall transformer: 120Vac/220Vac input, 12Vdc output (includes international wall-plug adaptors).

The **Operator Interface** consists of:

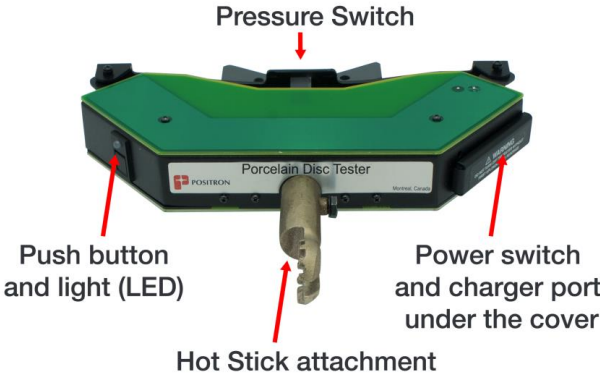


Figure 2

The **Charger port** is used to recharge the Probe’s internal battery.

The E-field Probe uses two infrared detectors to detect the position of the pressure switch.

The two infrared detectors are identified as **IR1** and **IR2**.

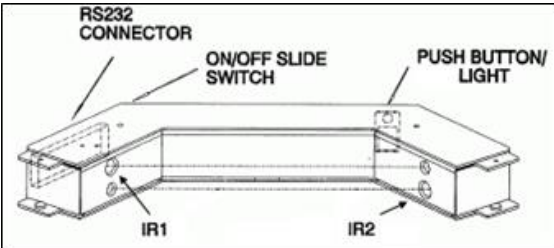


Figure 3

The ON / OFF Power Switch is located under a cover and is used to switch the power ON or OFF. See Figure 4. Set the switch towards the RS232 connector to switch the unit ON.

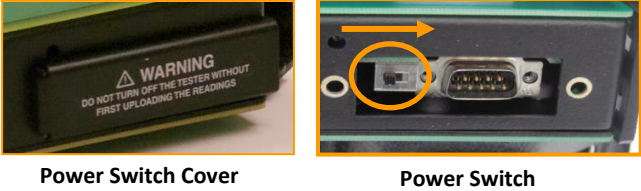


Figure 4

Once a testing session is completed, slide the switch away (left) from the charger port to switch the unit off. When the power is switched off, the accumulated data is lost and is no longer available for the optional engineering investigation via a download.

**3.2 Probe Charger**

The Probe’s battery is recharged using a 120Vac/220Vac universal wall charger connected to a cable terminated with a DB-9, RS232 female connector to connect to the Probe. A set of AC charger adaptors is provided to accommodate various country standards. For charging the Probe in the field, a 12Vdc auxiliary automotive charger cable terminated in a DB-9 connector is supplied to recharge the battery from a car or truck.

Both the AC power charger and the automotive DC charger are equipped with an LED status to report on when the battery is charged. When first plugged in to charge, the LED will glow red. After 9 hours on charge, the LED will glow green, indicating that the charging time is completed.

The battery should be recharged overnight the day before a testing session. The battery charge will last two days if the power switch is left in the ON position. However, it is recommended to recharge the battery of the probe the night before a testing session.

The battery can be recharged with the power switch in the ON or OFF position; however, the Probe will charge faster when the power is switched off (recommended).

**3.3 Porcelain Disc Tester Hot Stick Attachment**

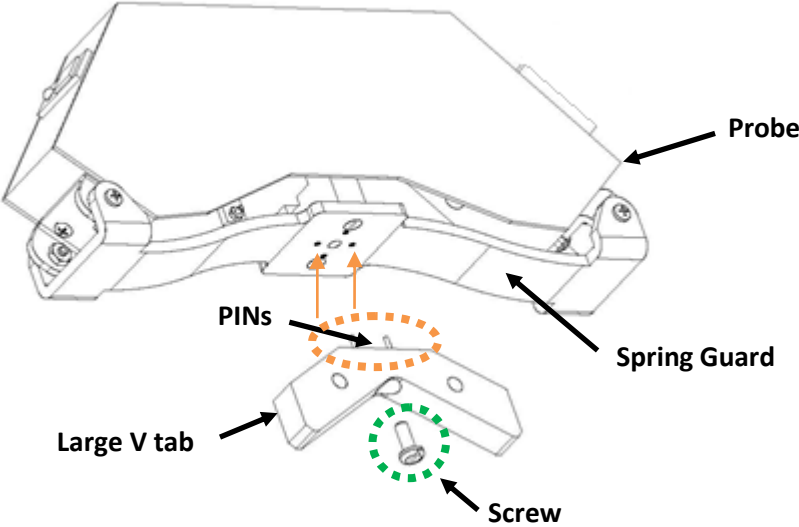
The Porcelain Disc Tester has an integrated hot-stick attachment on top of the probe.



Figure 5

**3.4 Porcelain Disc Tester Pressure Switch Assembly**

The pressure switch is equipped with a large V shaped tab. It is used to take a reading near the pin of each tested Porcelain disc in a string.





---

# Chapter 4

## Testing Procedure

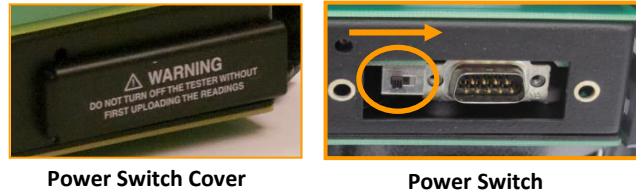




## 4.0 Testing Procedure

### 4.1 Switching the Probe On

To activate the Probe, remove the Power Switch Cover and move the power switch to the right, toward the DB-9 connector, as shown in Figure 12. The Probe will first enter the Power-On Self-Test.



Upon switching the Probe “ON”, the Power-On Self-Test process commences: the tone, the LED, the internal memory and the infrared detectors are automatically verified.

**The power-up sequence is described below:**

1. Apply power by sliding the switch,
2. The LED will flash **Yellow** then flash Green four times during the memory test,
3. To fully check the 2 infrared beams (IR1, IR2), apply pressure on the Pressure Switch at the beginning of the long tone. This action will interrupt the IR beams.
4. The LED will stop flashing and the long tone will stop the moment the Pressure Switch is pressed. The probe goes to “Sleep” mode: The LED status is OFF.

Ensure that there is no pressure on the Pressure Switch at the beginning of the Power-On Self-Test.

If the Pressure Switch is not pressed during the long tone, the tone and the LED will shut off after flashing 12 times. The IR sensors will be only partially tested.

Once the Probe’s power has been switched on and the Power-On Self-Test procedure is finished, the probe goes into sleep mode.

**Switch off the probe’s power after use.**



**Ensure the probe has been charged the night before going out into the field for a testing session. The battery of the probe is best maintained for longer life by avoiding a complete discharge.**

#### 4.2 Performing a porcelain insulator string test

The operator can now prepare to perform a test. The operator presses the Push button on the probe to wake up the probe in Awake Mode. Ensure that the LED of the Probe is flashing RED than GREEN.

The “No activity” timer is set to 8 minutes on the following events:

- on wake up of the probe,
- on Electric Field detection,
- during reading (Tab pressure).



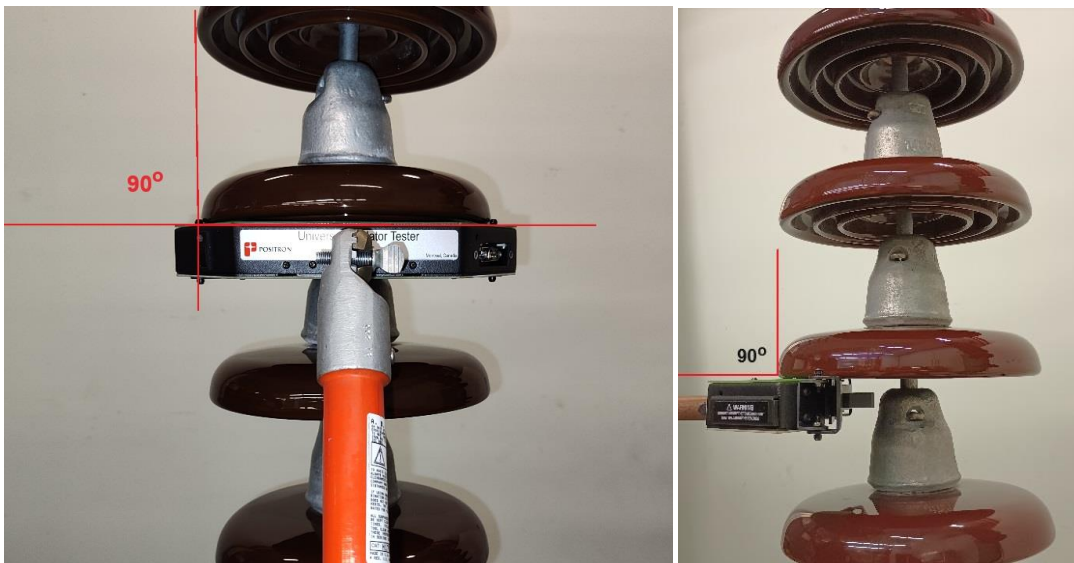
After 8 minutes of no activity, the probe goes into Sleeping Mode to save battery power.

Once the Probe and the hot stick are securely fastened, approach the Tester near the insulator till a tone is produced on detection of the E-field. Then the probe will produce a short beep at each pressure on the pin of a porcelain disc.

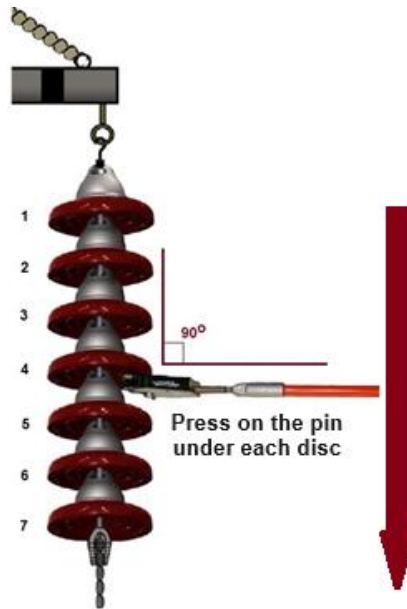
Readings are taken on the pin of each disc, from the ground end to the High Voltage end. Do not press twice on the same pin.

It is safe to use because there is no electrical contact with the metallic parts of the energized insulator.

**Make sure the probe is centered to the insulator string during the reading.**



**The probe must be perpendicular to the string in both directions.**



Taking a reading of disc # 4

## NOTE



To ensure that the probe is perpendicular to the string, touch the surface under the disc before applying a pressure near the pin of the disc.

The reading is taken when the pressure is released.

#### 4.3 Result interpretation

Interpret the color and the sound only after releasing the pressure on the pin of the last disc.

Color	Interpretation
GREEN	All discs are good
RED + Sound	Four or more bad discs
YELLOW	One bad disc
YELLOW (may be RED)	Two or three bad discs

Press the push button after the interpretation to go into sleep mode.

Press again to wake up the probe and test the next string.

#### 4.4 Usage

The Porcelain Disc Tester instantly alerts the user of a safety issue on strings of Porcelain discs used on 115 kV to 230 kV lines. On four or more conductive discs, the line workers are alerted using audible and visual (Red flashing) alarm. String replacement (Maintenance) is signaled if one or more conductive discs are detected (Yellow or Red flashing). In absence of leaking discs, the light (LED) flashes in Green. Heavy surface contamination may also be detected on Porcelain and Glass insulators.

A minimum of 6 discs per string is required. A maximum of 14 discs per string is recommended.

Voltage [kV AC]	NO Insulators	MH current good required	Maximum bad insulators
24/33 D.E.	3	2	1
66	4	2	2
66 D.E.	5	3	2
115/138	7	4	3
115/138 D.E.	9	6	3
230	12	8	4
230 D.E.	14	10	4
500	26	19	7
500 D.E.	28	21	7

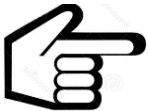
*Source:* Jeff Laninga, Eng. Manitoba Hydro

#### Safety Table example

#### 4.5 Important General Notes

- ✓ If the Probe has not been used for more than 6 months, recharge its battery before switching ON the power of the Probe.
- ✓ The Probe's battery should be recharged overnight (9 hours minimum) before each day of testing. If the power switch remains ON, the battery will discharge completely after approximately two days. Avoid discharging completely the battery by sliding the power switch to OFF.
- ✓ Recharge the battery of the Probe the night before the day of testing.
- ✓ Switch the power OFF when the Probe is left unused. To switch the Probe OFF, remove the cover and move the slide switch away from the 9 pins connector.
- ✓ To verify that the power is ON, press the push-button; the LED should flash, then press the push-button again to switch the light OFF.
- ✓ Do not use the Probe in rain or snow or during lightning.
- ✓ To recharge the battery, remove the RS232 cover (3" x 1"), plug the charger cable to the Probe and plug the universal wall transformer to a 120/220 Vac source, 50 or 60 Hz.
- ✓ If the battery is completely discharged (No light on power-up), switch the Probe OFF while the battery is recharging. It is not necessary to switch the Probe OFF during a recharge, however, the battery will recharge faster if the Power switch of the Probe is switched OFF (Recommended).

#### WARNING



The equipment covered in this manual should be used and serviced only by competent and trained personnel familiar with and following good work safety practices. This equipment is intended solely for the use by such trained personnel. This manual is not intended as a substitute for adequate training and experience. Appropriate safety procedures must always be followed in the use of this equipment. If the insulator string is producing abnormally high noise, stay away from this insulator.

#### NOTE



This equipment will detect any conductive defect irrespective of the cause of the conductive defect. The tester does not detect non-conductive defects including mechanical defects that have not resulted in a conductive defect. High levels of surface contamination may result in Yellow or Red alarms.

---

# Chapter 5

## Specifications



## 5.0 Specifications

Parameter	Specifications
Number of discs per string	6 to 14 discs (115 kV to 230 kV)
Maximum voltage	1,000 kV phase to ground
Minimum battery recharging time	10 hours (one night)
Cumulative use between charges	12 hours
Maximum usage period between battery charges	1 day
Operating temperature range: <ul style="list-style-type: none"> <li>Probe</li> </ul>	-4°F to 125°F (-20°C to +50°C)
Dimensions of the tester (including the attachment)	10.5" x 9" x 2" (27 cm x 23 cm x 5 cm)
Weight	408 g (0.9 lb.)
Maximum humidity level	95% at 25°C
Factory calibration (User recalibration is not required)	500 raw units = 100 kV/m longitudinally

**NOTE** To be used on AC lines only





---

# Chapter 6

## Important Information



## 6.0 Important Information

### 6.1 Service and Support

#### Positron Contact Information

<p><b>General information:</b>                  Positron Inc.                  5101 Buchan Street                  Suite 220                  Montreal, Québec, Canada                  H4P 2R8                  US and Canada: 1-888-577-5254                  International: 1-514-345-2214                  Fax: 1-514-345-2271                  E-mail: <a href="mailto:info@positronpower.com">info@positronpower.com</a>                  Web site : <a href="http://www.positronpower.com">www.positronpower.com</a></p>	<p><b>Receiving address:</b>                  Positron Inc.                  5180 Pare Street                  Montreal, Québec, Canada                  H4P 1P3</p>
<p>Repairs</p>	<p>US and Canada: 1-888-577-5254,                  Option 1                  International: 001-514-345-2220,                  Option 1</p>

We can communicate also by Skype or WhatsApp if pre-advised by e-mail.

### 6.2 Technical Customer Support

Positron is committed to providing excellent ongoing technical support to its customers. A team of specialists is always available for telephone consultations, or for on-site visits to assist in maintenance and troubleshooting.

For more information, or assistance in the planning, configuration, use and interpretation of data produced by the equipment, contact Technical Customer Support (TCS) at 1-888-577-5254, Option 1, Option 3 (US and Canada) or +1-514-345-2220 Option 1, Option 3 (International) or email [scarbonaro@positronpower.com](mailto:scarbonaro@positronpower.com). Skype, Teams or ZOOM calls can be arranged.

### 6.3 Customer Training

Full customer training courses on the operation and results interpretation of Positron Insulator Testers are available. For information, contact Positron.

### 6.4 Repair Service

All warranty repairs are performed at no cost. Positron reserves the right to repair or replace any equipment that has been found to be defective.

For information about out-of-warranty repairs, contact Positron’s Repair department at 1-888-577-5254 (US and Canada) or +1-514-345-2220 (International).

Due to the varied nature of repairs, no specific turnaround can be guaranteed, but the average turnaround time is two weeks from date of receipt. In emergency situations, special arrangements can be made. All repaired items are warranted for a period of 180 days, or balance or warranty, whichever is longer.

Before returning any items to Positron for repair, warranty repair or replacement, call or e-mail the Repair Department ([customerservice@positronpower.com](mailto:customerservice@positronpower.com)) to obtain a Return Material Authorization (RMA) number. Parts returned without RMA numbers cannot be accepted. The RMA number must always be clearly marked on all boxes and crates and on all shipping documents.

To accelerate the repair process, whenever possible, include a report detailing the reason for return with the unit(s). Also, please include the name and phone number of a contact person should our Repair department need further information.

When packing items being returned for repair, please ensure they are properly packed and shipped in their carrying cases to avoid further damage.

## 6.5 Warranty

Subject to the provisions of this paragraph, Positron warrants that the equipment shall perform in accordance with Positron's specifications. The warranty on the electronic Probe is three (3) years from the date of shipment. The warranty fully covers workmanship, materials and labor. Positron shall, at its sole discretion, repair or replace the problem unit. A detailed warranty description is available on request.

During the warranty period, freight costs to ship defective equipment to Positron are borne by the Customer, while the return of replaced or repaired equipment is at Positron's expense. To obtain an RMA for warranty repair, e-mail [customerservice@positronpower.com](mailto:customerservice@positronpower.com).

## 6.6 Limitation of Liability

Subject to anything to the contrary contained herein, Positron's sole obligation and liability and the customer's sole remedy for Positron's negligence, breach of warranty, breach of contract or for any other liability in any way connected with or arising out of, the equipment or any services performed by Positron shall be as follows:

- In all situations involving performance or non-performance of the equipment or any component thereof, the customer's sole remedy shall be, at Positron's option, the repair or replacement of the equipment or said component.
- For any other claim in any other way related to the subject matter of any order under warranty, the customer shall be entitled to recover actual and direct damages; provided that Positron's liability for damages for any cause whatsoever, and regardless of the form of the action, whether in contract or in tort (including negligence), shall be limited to the value of the order.

Positron shall not be obligated to repair or replace any item of the equipment which has been repaired by others, abused or improperly handled, improperly stored, altered or used with third party material or equipment, which material, or equipment may be defective, of poor quality or incompatible with the equipment supplied by Positron, and Positron shall not be obligated to repair or replace any component of the equipment which has not been installed according to Positron specifications.

IN NO EVENT SHALL POSITRON BE LIABLE FOR ANY INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL, PUNITIVE, EXEMPLARY OR SIMILAR OR ADDITIONAL DAMAGES INCURRED OR SUFFERED INCLUDING LOSS OF PROFITS, LOSS OF REVENUES, LOSS OF DATA, LOSS OF BUSINESS INFORMATION, LOSS OF GOODWILL, LOSS OF LIFE, STAFF INJURY, LOSS OF EXPECTED SAVINGS OR

BUSINESS INTERRUPTION ARISING OUT OF OR IN CONNECTION WITH THE EQUIPMENT, A PURCHASE ORDER SUPPLIES, MAINTENANCE SERVICES OR OTHER SERVICES FURNISHED HEREUNDER, EVEN IF POSITRON HAS BEEN ADVISED OR IS AWARE OF THE POSSIBILITY OF SUCH DAMAGES.

EXCEPT AS EXPRESSLY SET FORTH IN THIS AGREEMENT, POSITRON DISCLAIMS ANY FURTHER CONDITIONS, REPRESENTATIONS OR WARRANTIES, WHETHER WRITTEN OR ORAL, EXPRESSED OR IMPLIED, INCLUDING THE CONDITIONS AND WARRANTIES OF MERCHANTABILITY, MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE, PERFORMANCE AND THOSE ARISING FROM STATUE, TO THE EXTENT PERMITTED BY LAW. POSITRON DOES NOT WARRANT THAT THE SYSTEM WILL OPERATE WITHOUT INTERRUPTION OR THAT IT WILL BE ERROR FREE.

#### **6.7 Disclaimer Notice**

The equipment covered in this manual should be used and serviced only by competent and trained personnel familiar with and following good work safety practices. This equipment is intended solely for the use by such trained personnel and is not intended as a substitute for adequate training and experience. Appropriate safety procedures must be followed at all times in the use of this equipment.

The descriptive information contained in this manual is not intended to and does not cover all details, usages, or methods of use of this equipment, and such information is not intended to discuss all situations or contingencies which might be encountered with respect to the operation, maintenance or use of the equipment. This information is provided for the purposes of description only and is not to be relied upon or utilized by any purchaser as instructions, warranties, specifications or use certifications. Although Positron Inc. has made every effort to ensure the accuracy of the information contained herein, this document is subject to change without notice due to ongoing product development. Any additional information which may be required by any purchaser regarding the use, maintenance, installation or operation of this equipment should be referred to Positron Inc.

#### **6.8 Cancellation and Rescheduling Charges**

Should the customer cancel, prior to shipment, any part of an order, the customer agrees to pay to Positron cancellation charges, not as a penalty, which shall total all expenses, including labor expenses, incurred by Positron prior to said cancellation. Modified equipment that has been specially developed for the customer's specific applications shall not be subject to cancellation. Cancellation or rescheduling is not permissible after shipment of the System.

## Positron's Suite of Insulator Tester Products

Simply slide the tester sled along the insulator (string).

Positron's Insulator Testers and software enhances worker safety with an Instant Graphical Download of the insulator's surrounding E-field for immediate on-site viewing, providing defect's location and warning for **DANGEROUS** conditions.

### Porcelain Tester

The Porcelain Tester is used on Porcelain and Glass insulator strings.

For Glass insulators, it is used for contamination assessment.



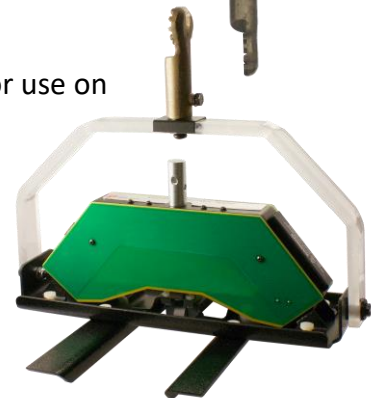
### Composite Tester

The Composite Tester is used to detect floating or connected conductivity along the length of Composite (or Polymeric) insulators.



### Substation Insulator Tester

The Substation Insulator Tester has been specifically designed for use on energized equipment in substations to test bushings and insulators of all shapes and sizes.



Positron's Mapping Software displays at a glance the health and location of the insulators in the power network.

