

# LIGHTNING ARRESTER and LEAKAGE TESTER

*and ACCESSORIES*

Operating & Instruction Manual



Arrester Tester Patent No. 6,124,714



**HD ELECTRIC COMPANY**


1475 LAKESIDE DRIVE • WAUKEGAN, ILLINOIS 60085 U.S.A.  
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# IMPORTANT SAFETY INFORMATION


**READ AND UNDERSTAND THESE INSTRUCTIONS PRIOR TO USE. THESE OPERATING INSTRUCTIONS ARE NOT A SUBSTITUTE FOR PROPER TRAINING IN THE USE OF THIS EQUIPMENT.** High voltage systems present serious hazards, including the risk of death or serious injury due to arcing, thermal burns and electrocution. HD Electric's products are intended solely for use by professionals with knowledge, training and experience in the use of the equipment and its accessories in and around high voltage systems.

All applicable federal, state, company and OSHA work practices must be followed. If you are unfamiliar with the work practices required, **DO NOT PROCEED**. Call HD Electric Company if you have any questions regarding this equipment. These important labels are affixed to the products. Read and understand each of them before proceeding.

## THESE IMPORTANT LABELS ARE AFFIXED TO THE PRODUCTS. READ AND UNDERSTAND EACH OF THEM BEFORE PROCEEDING.

ARRESTER TESTER	
<b>LO-RANGE</b>	<b>HI-RANGE</b>
4kV	25/69kV
<b>CAT NO.</b>	<b>SERIAL NO.</b>
AT-100	IAT1103019
 <b>HD ELECTRIC COMPANY</b> WAUKEGAN, IL 60085 USA	

	<b>DANGER</b> ELECTRIC SHOCK HAZARD ELECTRICAL ARC HAZARD READ INSTRUCTIONS AND OPERATIONS MANUAL BEFORE USE
	<small>Always wear personal protective equipment including eye and face protection, insulating gloves and FR clothing. All OSHA and company work practices must be followed. Always maintain proper working clearances. Use only HD Electric probes appropriate and intended for the work to be performed. This product is designed for use by professionals trained in its use and application in and around high voltage electrical equipment. If you are not trained in the work methods required for safe operation, <b>DO NOT PROCEED</b> until you obtain the proper training. Failure to follow these recommended practices may result in severe burns, serious injury or death.</small>
<small>HD Electric Company www.hdelectriccompany.com Phone: (847) 473-4980</small>	

<b>NOTICES - CAUTIONS - WARNINGS</b>
<b>NOTICES</b> - This product is designed for use by professionals trained in its use and application in and around high voltage electrical equipment. If you are not trained in the work methods required for safe operation, do not proceed until you obtain the training.
<b>CAUTIONS</b> - This product was tested before leaving the factory but it must be inspected prior to and after each use for proper working condition. All fiberglass was tested per OSHA at 100kV/ft <sup>3</sup> 5 min. Be aware that dirt, moisture, mechanical fatigue and other factors reduce the dielectric strength of the product. If any defect or condition is noted, do not use this product. Remove from service and arrange for repair.
<b>WARNINGS</b> - Rigorous hot stick work practices and all OSHA and company work practices must be followed. Always wear approved coversup and safety equipment. Read and understand instructions prior to use. Misuse and abuse of this product can lead to severe injury or death.
 <b>HD ELECTRIC COMPANY</b> 472 LAKESIDE DRIVE • WAUKEGAN, ILLINOIS 60085 U.S.A. <small>CPV6L-03009</small>

<b>W A R N I N G</b> HOT STICK REQUIRED <b>W A R N I N G</b>
--

<b>DANGER</b> Keep Connecting Cord Free and Clear of Everything At All Times During Operation. <small>See Instructions #VMCWL-96</small>
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All meters require the use of accessory hotsticks, which may or may not be supplied with the meter. The minimum hotstick length required for safe use depends upon the particular operation; consult federal, state, company or OSHA specifications for the proper hotstick length for the intended operation.

The users of this meter should always be equipped with personal protective equipment including high voltage gloves, flame retardant clothing, eye and face protection. Some applications may require additional protective equipment.

Accessory probes are available for all meters. Always use the proper probe(s) for your application.

Failure to follow these and all other warnings and safety precautions may result in severe injury or death.

## GENERAL DESCRIPTION

The AT-100 Arrester Tester is constructed with epoxy encapsulated high voltage resistors, a connecting cord and a meter display. The major elements are shown here:



The high voltage resistors limit the current through the connecting cord to a maximum of about two milliamps. Although the connecting cord is insulated for voltage up to 10kV, it should always be kept free and clear from you, ground and any other conductors.

**WARNING:** The AT-100 requires add-on resistor sticks for higher voltage ranges. Always completely remove the arrester tester from the live circuit before adding or removing add-on resistor sticks. Always use add-on resistor sticks in pairs, one on each stick.

### AT-100 ARRESTER TESTER

AT-100 – DUAL RANGE: 4-25KV AND 25-69KV WITH optional accessory R-69 add-on resistor sticks.

The AT-100 measures DC leakage current on installed arresters. The DC test voltage is equal to the peak AC line voltage; for example, on a 15kV system with a line-to-ground voltage of 7200V, the AT-100 DC test voltage is about 10kV.



AT-100 Scale

# OPERATING INSTRUCTIONS

## PRE-USE INSPECTION

**WARNING:** Before using the instrument be sure to test and inspect the equipment to insure that it is functioning properly and is in safe, working condition. Failure to do so may cause serious injury or death and may result in erroneous test measurements.

Before making any high voltage tests, inspect the arrester tester as follows:

- 1) Make certain the instrument is clean, dry and waxed to a clear shiny surface.
- 2) Inspect the cord for cracked insulation.
- 3) Be sure that you are using hotsticks of the appropriate length, and examine each hotstick to insure that it is clean, dry and waxed to a clear shiny surface.
- 4) Attach the appropriate probes for overhead or underground applications (see page 7) and that the probes are properly installed and tightened.
- 5) Install add-on resistor sticks if necessary for the range being tested.
- 6) Before and after testing a lightning arrester with the AT-100, the tester itself must be tested. Simply connect the AT-100 between an energized line and ground; the meter should indicate about full scale (or slightly lower on 4kV systems).

Apply the AT-100 to the energized system for only as long as necessary to make a measurement, which is usually only long enough to obtain a clear indication of the meter reading.

There is no calibration for the AT-100. All readings are  $\pm 10\%$ .

## OPERATING INSTRUCTIONS *continued*

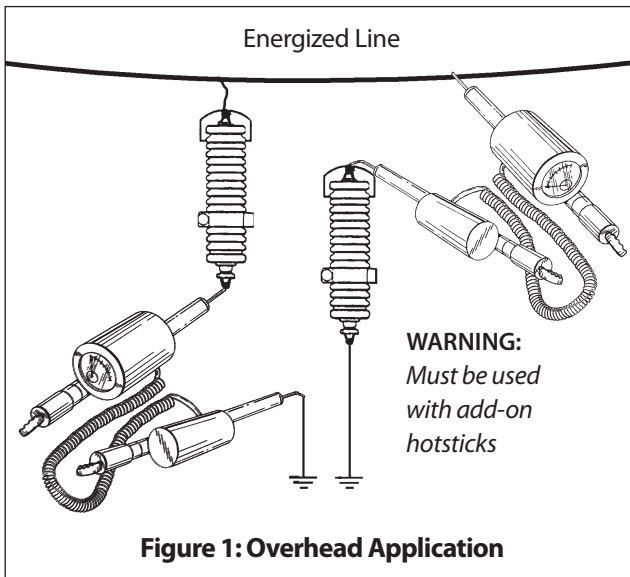
### TESTING OVERHEAD APPLICATIONS

For overhead arresters, two different test connections are possible (see Figure 1).

1. Remove the connection from the top of the arrester to the conductor. With the bottom of the arrester connected to ground, connect the AT-100 from the energized conductor to the top of the arrester.
2. Remove the connection from the bottom of the arrester to ground. With the top of the arrester connected to the energized conductor, connect the AT-100 from the bottom of the arrester to ground.

The meter displays leakage current, if any. With either connection, arresters with leakage currents greater than 20 microamps DC are classified as high leakage and should not be energized. The AT-100 internal high voltage resistors protect both the user and the arrester from a dead short in the arrester.

**CAUTION:** The AT-100 tests lightning arresters with high voltage DC. Some arresters can store a high voltage DC charge. If the arrester will be handled after testing, the arrester should be discharged. Discharge the arrester by grounding the arrester on both ends at the same time.



**Figure 1: Overhead Application**

## OPERATING INSTRUCTIONS *continued*

### TESTING UNDERGROUND APPLICATIONS

For underground elbow type arresters, the arrester is connected to a 2-way feed-thru bushing with its ground cable grounded (see Figure 2). The arrester tester must be used with two underground bushing probes. For 15kV or 25kV systems, use model ASP-15/25, and for 35kV systems, use model ASP-35U, with an R-69 resistor stick installed on each stick. The arrester tester is connected from a live bushing to the feed-thru bushing with the elbow arrester. The underground

arrester should always have its ground cable connected to ground. The meter displays leakage current, if any. Arresters with leakage currents greater than 20 microamps DC are classified as high leakage and should not be energized. The AT-100 internal high voltage resistors protect both the user and the arrester from a dead short in the arrester.

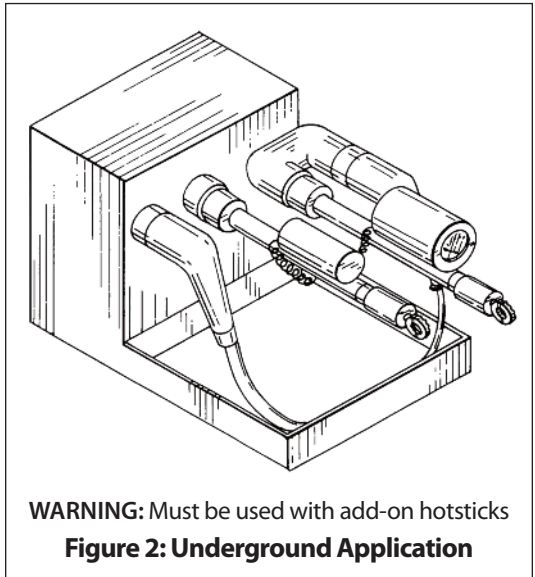
After completing testing, test the AT-100 again by connecting it from an energized line to ground. The meter should indicate about full scale.

### ADVANCED APPLICATIONS

The AT-100 can be used as a general purpose DC high potential tester for testing the leakage current of devices other than arresters such as insulators, open switch contacts, crossarms, etc. Testing with DC minimizes the much higher AC capacitive current and allows the user to test for actual DC leakage current. The same green/red scale that applies to arresters is applicable to most other equipment.

### CARE AND MAINTENANCE

Periodic regular maintenance is required to keep the arrester tester in proper operating condition. Keep the arrester tester clean and dry and always store it in its case. The fiberglass sticks should be kept clean and free of dirt, contamination and marking. Examine the cord for cracking or other damage prior to each use. We recommend you test the AT-100 before and after each test, as described in the Pre-Use Inspection. Contact HD Electric Company for details.



## PROBES AND ACCESSORIES

**WARNING:** ALWAYS use probes appropriate to your application. NEVER use overhead probes in underground applications. Failure to use the correct probe can result in arcing or electrical contact and may cause serious injury or death. If you are not trained in the particular operation or are not sure about the appropriate probe for your application **DO NOT PROCEED.**

### OVERHEAD PROBES

- OLPS-5 brass hook probe
- OLPS-6 brass pigtail probe

### UNDERGROUND DEAD FRONT BUSHING PROBES

- ASP-15/25 for use in 15kV and 25kV loadbreak bushings
- ASP-35U for use in 35kV loadbreak bushings

### INSULATED UNDERGROUND PROBE

- GCP-1 for general underground use on grounded terminals and exposed high voltage terminals.

### ADD-ON RESISTOR STICKS

- R-69 for use on voltages above 25kV up to 69kV

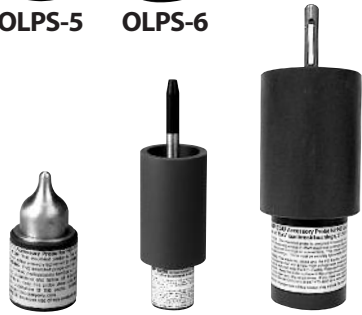
### REPAIRS

All repairs are performed at HD Electric Company. If any damage is found please contact HD Electric Company at 847-473-4980 to arrange for service.



OLPS-5

OLPS-6



GCP-1

ASP-15/25

ASP-35U



R-69

## LIMITED WARRANTY AND LIMITATION OF LIABILITY

This warranty applies to all products sold by HD Electric Company (the "Products"); provided, however, that the term Products does not include any third party products purchased through HD Electric Company, for which no warranties are made (the "Third Party Products"). Third Party Products may be subject to a separate manufacturer's warranty; [should you have any question regarding whether a separate warranty applies, please contact HD Electric Company].

NOTICE: READ THIS LIMITATION OF WARRANTY AND LIABILITY BEFORE BUYING OR USING THE PRODUCTS CONTAINED HEREIN.

It is impossible to eliminate all risks associated with the use of the Products. Risks of serious injury or death, including risks associated with electrocution, arcing and thermal burns, are inherent in work in and around energized electrical systems. Such risks arise from the wide variety of electrical systems and equipment to which Products may be applied, the manner of use or application, weather and environmental conditions or other unknown factors, all of which are beyond the control of HD Electric Company.

HD Electric Company does not agree to be an insurer of these risks.

WHEN YOU BUY OR USE THESE PRODUCTS, YOU AGREE TO ACCEPT THESE RISKS.

HD Electric Company warrants to the original purchaser that the Products (excluding any third party products purchased through HD Electric Company, for which no warranties are made) will be free from defects in material and workmanship, under normal use and regular service, and preventative maintenance for a period of one (1) year from the date of shipment (the "Warranty Period"). Should any failure to conform with this warranty be found during the Warranty Period, you must notify HD Electric Company of your claim within thirty (30) days of discovery, and within the Warranty Period. Your failure to give notice of claims of breach of warranty within the Warranty Period shall be deemed an absolute and unconditional waiver of claims for such defects. HD Electric Company will have no responsibility to honor claims received after the date the applicable Warranty Period expires.

Upon notice of your claim, HD Electric Company will provide a return authorization number, and further instructions on how to return the product for service. You must follow HD Electric Company's instruction. You are responsible for all Product removal, handling, re-installation, and shipping (both to and from HD Electric Company). Products returned for repair, as well as repaired or replacement Products shall be sent postage / freight prepaid. After receipt of a product which HD Electric Company determines is defective, HD Electric will, at its option, either (1) repair (or authorize the repair of) the Product or (2) replace the Product, subject to the following: The Products are made using parts sourced from a variety of manufacturers. Due to the rapidly changing technology environment, parts may become obsolete / unavailable over time (end of life). In the event that a Product cannot be repaired or replaced due to unavailability of parts, HD Electric Company will use commercially reasonable efforts to obtain substitute parts or conduct work around design, but cannot guarantee its ability to do so.

Items not found defective will be returned at your expense, or failing receipt of instruction from you on return of such items within five (5) business days of our notice to you that the product is not defective, HD Electric may dispose of the product at its discretion and with no liability to you. HD Electric Company's determination of defects is final. Products repaired or replaced during the Warranty Period shall be covered by the foregoing warranties for the remainder of the original Warranty Period or ninety (90) days from the date of delivery of the repaired or replaced Products, whichever is longer.

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HD Electric Company does not warrant any third party products or associated hardware or their performance or suitability for use and application. Such items are provided "as-is".

All repairs must be authorized by HD Electric Company. Unauthorized repairs will not be reimbursed under any circumstances.

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