LIGHTNING ARRESTER and LEAKAGE TESTER and ACCESSORIES

Operating & Instruction Manual

Arrester Tester Patent No. 6,124,714
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 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.

All meters require the use of accessory hot sticks, which may or may not be supplied with the meter. The minimum hot stick length required for safe use depends upon the particular operation; consult federal, state, company or OSHA specifications for the proper hot stick 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 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 milliamperes. 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. The AT-100 can be used on 50Hz and 60Hz systems.
OPERATING INSTRUCTIONS

Pre-Use Inspection

WARNING: Before using the instrument be sure to test and inspect the equipment to ensure 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 hot sticks of the appropriate length, and examine each hot stick to ensure 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 ± 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](image)
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 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
If any damage is found please contact us at 800-435-0786 to arrange for service.
TERMS AND CONDITIONS OF SALE

HD Electric Company is herein referred to either as “HDE” or “Seller” or the customer or person or entity purchasing goods or services (hereinafter collectively referred to as “Goods”) is referred to as the “Buyer.” These Terms and Conditions, any price list or schedule, quotation, acknowledgment or invoice from HDE relevant to the sale of the Goods and all documents incorporated by specific reference therein, constitute the complete and exclusive statement of the terms of the agreement between HDE and the Buyer. HDE reserves the right to make changes in prices or sales terms or to discontinue any product without notice and shall be entitled to make adaptations or modifications of any equipment without notice.

1. PRICE: Unless a fixed price is quoted, the price at which this order is accepted is subject to adjustment to HDE’s price in effect at the time of order. Any current or future tax or governmental charge (or increase in same) affecting Seller’s costs or production, sale or delivery of which Seller is required to pay or collect in connection with the sale, purchase, delivery, storage, processing, use or consumption of Goods (but not taxes on Seller’s net income) shall be passed on to Buyer for Buyer’s account and shall be added to the price.

2. TERMS OF PAYMENT: Terms are stated on HDE’s invoice in U.S. currency. HDE shall have the right, among other remedies, either to terminate this agreement or to suspend further performance under this or other agreements with the Buyer in the event Buyer fails to make any payment when due, which agreements Buyer and Seller hereby amend accordingly, or HDE otherwise deems itself insecure. Buyer shall be liable for all expenses, including attorneys’ fees, incurred by Seller in connection with the collection of any amount finally determined to be owed by Buyer to Seller under this Agreement, whether or not the same shall become uncollectible. Buyer shall be liable for all transportation, handling and storage costs and other additional expenses resulting therefrom. All claims for shipping errors, lost shipments or any other discrepancies must be made within ninety (90) days or they will be disallowed and deemed waived.

3. SHIPMENT AND DELIVERY: Unless expressly otherwise provided, shipments are made F.O.B. HDE’s shipping point. Risk of loss or damage and responsibility shall pass from HDE to Buyer upon delivery to and receipt by common carrier. Any claims for shortages or damages suffered in transit are the responsibility of Buyer and shall be submitted by the Buyer directly to the carrier. Shortages or damages must be acknowledged and signed for at the time of delivery. Any claims for shortages or damages are not required to be filed within thirty (30) days from the date of receipt of the goods by Buyer. HDE reserves the right to make partial shipments, as all option, shall not be bound to deliver tender of delivery of any Goods for which Buyer has not provided shipping instructions. If the shipment of the Goods is postponed or delayed by Buyer for any reason, Buyer agrees to reimburse HDE for any and all handling and storage costs and other additional expenses resulting therefrom. HDE’s obligation under this warranty, and the Buyer’s exclusive remedy for the breach thereof, shall be limited to, at HDE’s option, repair or replacement of any Goods. HDE shall not be liable for delays in performance or for non-performance due to acts of God; acts of Buyer; war; flood; water; sabotage; strike, labor disputes, civil disturbances or riots, government regulations, restrictions, allocations, laws, regulations, or orders; unavailability of or delay in transportation, deadlock, or unforeseen circumstances or events beyond HDE’s reasonable control. Deliveries or other performance may be suspended for an appropriate period or cancelled by HDE upon notice to Buyer in the event of any of the foregoing, but the balance of this agreement shall otherwise remain unaffected. If HDE determines that its ability to supply the total demand for the Goods, or to obtain materials used directly or indirectly in the manufacture of the Goods, is hindered, limited or made impracticable due to causes set forth herein, HDE shall have the right to allocate its available supply of the Goods or such materials (without obligation to acquire other supplies of any such Goods or materials) among itself and its purchasers on such basis as HDE determines to be equitable under the circumstances for which any failure of performance may result which is beyond HDE’s control.

4. LIMITATION OF REMEDY AND LIABILITY: The Seller/C ontractor shall comply with all applicable federal, state or local law s, rules, regulations, or orders. Seller/C ontractor shall comply with Executive Order 11246, as amended by Executive Order 11371, and the applicable provisions of the Office of Federal Contract Compliance Programs (OFCCP), 41 CFR Part 60, which are incorporated herein by reference. No Buyer hereby agrees not to re-sell or divert any goods contrary to such laws. HD Electric Company ® products are available through HD Electric Company ® sales representatives worldwide.

5. INSTALLATION: Buyer shall be responsible for receiving, inspecting, testing, storing, installing, start-up and maintaining all Goods.

6. ASSIGNMENT: Buyer shall not assign its rights or delegate its duties hereunder or any interest herein without the prior written consent of HDE, and any such assignment, without such consent, shall be void.

7. PRICES: Unless a fixed price is quoted, the price at which this order is accepted is subject to adjustment to HDE’s price in effect at the time of order. Any current or future tax or governmental charge (or increase in same) affecting Seller’s costs or production, sale or delivery of which Seller is required to pay or collect in connection with the sale, purchase, delivery, storage, processing, use or consumption of Goods (but not taxes on Seller’s net income) shall be passed on to Buyer for Buyer’s account and shall be added to the price.

8. DISPUTE RESOLUTION: In the event of any disputes including, BUT NOT LIMITED TO, CONTRACT, BREACH OF WARRANTY, CLAIMS BASED IN TORT, NEGLIGENCE, PRODUCT LIABILITY, FRAUD, MARKETING, STATE OR FEDERAL REGULATIONS, ANY CLAIMS REGARDING THE ENFORCEABILITY OF THIS LIMITED WARRANTY, AND THE WARNER OF CLASS ACTION CLAIMS BETWEEN Buyer and Seller, either may choose to resolve the dispute by binding arbitration, as described below, instead of in court. THIS MEANS IF EITHER BUYER OR SELLER CHOOSE BINDING ARBITRATION, NEITHER PARTY SHALL HAVE THE RIGHT TO UGDATE SUCH CLAIM IN COURT OR HAVE A JURY TRIAL. DISCOVERY AND APPEAL RIGHTS ARE LIMITED IN BINDING ARBITRATION. Buyer and Seller agree that the proper venue for Arbitration is not so chosen by Buyer or Seller of all actions arising in connection hereunder shall be only in the State of Illinois and the parties agree to submit to such jurisdiction. No action, regardless of form, arising from or relating to transactions under the agreement, may be brought by either party more than two (2) years after the cause of action has accrued. The U.N. Convention on Contracts for the International Sales of Goods shall not apply to this agreement.

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12. PRICES: Unless a fixed price is quoted, the price at which this order is accepted is subject to adjustment to HDE’s price in effect at the time of order. Any current or future tax or governmental charge (or increase in same) affecting Seller’s costs or production, sale or delivery of which Seller is required to pay or collect in connection with the sale, purchase, delivery, storage, processing, use or consumption of Goods (but not taxes on Seller’s net income) shall be passed on to Buyer for Buyer’s account and shall be added to the price.

13. COMPLIANCE: Buyer shall comply with all applicable federal, state or local laws, rules, regulations, or orders. Seller/Contractor shall comply with Executive Order 11246, as amended by Executive Order 11371, and the applicable provisions of the Office of Federal Contract Compliance Programs (OFCCP), 41 CFR Part 60, which are incorporated herein by reference. No Buyer hereby agrees not to re-sell or divert any goods contrary to such laws.

14. MISCELLANEOUS: These terms and conditions supersede all other communications, negotiations and prior oral or written statements regarding the subject matter herein. No change, modification, rescission, discharge, abandonment or variation of any terms or conditions shall be effective unless made in writing and signed by both HDE and Buyer or its duly authorized representative.

15. DISPUTE RESOLUTION: In the event of any disputes including, BUT NOT LIMITED TO, CONTRACT, BREACH OF WARRANTY, CLAIMS BASED IN TORT, NEGLIGENCE, PRODUCT LIABILITY, FRAUD, MARKETING, STATE OR FEDERAL REGULATIONS, ANY CLAIMS REGARDING THE ENFORCEABILITY OF THIS LIMITED WARRANTY, AND THE WARNER OF CLASS ACTION CLAIMS BETWEEN Buyer and Seller, either may choose to resolve the dispute by binding arbitration, as described below, instead of in court. THIS MEANS IF EITHER BUYER OR SELLER CHOOSE BINDING ARBITRATION, NEITHER PARTY SHALL HAVE THE RIGHT TO UGDATE SUCH CLAIM IN COURT OR HAVE A JURY TRIAL. DISCOVERY AND APPEAL RIGHTS ARE LIMITED IN BINDING ARBITRATION. Buyer and Seller agree that the proper venue for Arbitration is not so chosen by Buyer or Seller of all actions arising in connection hereunder shall be only in the State of Illinois and the parties agree to submit to such jurisdiction. No action, regardless of form, arising from or relating to transactions under the agreement, may be brought by either party more than two (2) years after the cause of action has accrued. The U.N. Convention on Contracts for the International Sales of Goods shall not apply to this agreement.

16. CLASS ACTION WAIVER: BINDING ARBITRATION MUST BE ON AN INDIVIDUAL BASIS. THIS MEANS NEITHER BUYER NOR SELLER MAY JOIN OR CONSOLIDATE CLAIMS IN ARBITRATION BY OR AGAINST OTHERS, OR LITIGATE IN COURT OR ARBITRATE ANY CLAIMS AS A REPRESENTATIVE OR MEMBER OF A CLASS OR IN A PRIVATE ATTORNEY GENERAL CAPACITY. ADMINISTRATION OF ARBITRATION UNDER THIS AGREEMENT IS IN THE EXCLUSIVE DISCRETION OF THE ARBITRATOR. A DECISION OF THE ARBITRATOR IS FINAL AND BINDING. TO THE EXTENT NOT PROHIBITED BY LAW, CLAIMS OF A PARTY ARE EXCLUSIVE AND EACH PARTY WAIVES ANY RIGHT TO A JURY TRIAL, TO CONSOLIDATE OR COLLECTIVELY PROCEED IN ANY ARBITRATION OR COURT ACTIONS ON AN OPT-IN BASIS.