

# ClearTest®

## TRANSFORMER TESTER CT-300

*WITH AUTOMATIC SELF TEST*

### Operating & Instruction Manual



**HDE** HD ELECTRIC  
HDElectricCompany.com



## SAFETY

**WARNING:** The ClearTest Transformer Tester shall only be used on equipment known to be deenergized and/or discharged.

**CAUTION:** Using the ClearTest Transformer Tester on the secondary side of transformers may generate high voltages on the primary side. Stay clear of all primary connections while testing.

**OPERATIONAL IMPAIRMENT:** If the CT-300 is used in a manner not described in this instruction manual, the protection and effective operation of this equipment may be impaired.

### MANUFACTURING LOCATION

HD Electric • Southaven, MS. 38672, USA

## INTRODUCTION

The CT-300 ClearTest Transformer Tester is a versatile tool for quick and easy checks of transformers and the connections made to them. The transformer connections can include bundled secondaries or a cable run from the transformer to the meter.

In the field, the CT-300 is used to test the primary and secondary sides of new or reworked, deenergized single or three phase transformer installations.

In the shop the tester is used for quick screening of incoming and outgoing transformers (including their internal fuses and breakers). It tests both 1Ø and 3Ø transformers including PT's and other instrument transformers.

## HOW IT WORKS

The CT-300 is used in the field for testing connected transformers and their connected primary and secondary leads for both shorts or opens. Unlike a simple ohmmeter, the CT-300 measures transformer winding inductance and can differentiate true shorts from other low resistance windings or connected equipment such as meters.

**NOTE:** The CT-300 will detect most typical transformer defects including partially shorted windings such as turn-to-turn or layer-to-layer which result in an improper ratio.

### **BEFORE TESTING:**

- 1. DO NOT CONNECT TO ENERGIZED EQUIPMENT**
- 2. REMOVE SECONDARY LOAD**
- 3. REMOVE ALL PRIMARY UNDERGROUND CABLES**
- 4. PRESS AND HOLD TEST BUTTON FOR EACH CONNECTION - DO NOT HOLD THE TEST BUTTON FOR MORE THAN ONE CONNECTION**

## TESTING THE CLEARTEST TRANSFORMER TESTER

The CT-300 will automatically perform a complete self-test of the batteries, lights, beeper and all electronics when you press and hold the TEST button and is indicated by all lights and the beeper turning on. This self-test takes about one second to complete, after which the tester will begin testing whatever the leads are connected to. This self-test checks everything except for the test leads and internal fuse. To test the leads and fuse, short the test leads together and press the TEST button. A SHORT light after completion of the normal self-test indicates that the leads and fuse are good.

If the unit fails to operate, check or replace both batteries. If this self-test sequence is not completed, the unit will not perform any further testing and must be returned to the factory for service.

## USING THE CT-300

For single phase transformers, use these figures as guidelines to get started. For 3Ø transformers, refer to the following page.

When all connections are proper and the transformer itself is good, the CT-300 will beep and show OK. The OPEN indication light indicates a bad connection or an open transformer winding. A SHORT light indicates a short from phase to neutral or phase to phase in the transformer or the connections to it.

**NOTE:** Disconnect primaries or remove primary fuses before testing secondaries.

### RESULTS:

**OK:** Transformer coil is OK with no shorts or opens.

**SHORT:** Transformer has internal short or load is connected.

**OPEN:** Check connections. Transformer coil is open or check for blown fuse or breaker.

As a quick test in the shop, the CT-300 can be used to screen transformers by checking both primary and secondary windings and connections. Test for SHORTs on both primary and secondary windings and from primary to secondary. Test for OPENs on both primary and secondary windings to check for open windings or open breakers and fuses.

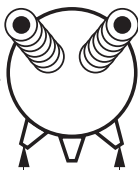
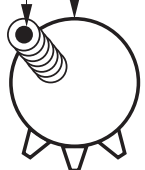
**This instrument is intended for quick and simple testing of transformers and the connections made to them. Do not energize visibly damaged equipment such as a leaking transformer even if the CT-300 indicates OK.**

## Test Connections for CT-300

across the primary  
OK

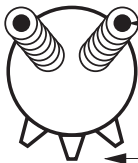
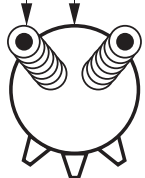


across the primary  
OK



across the secondary  
OK

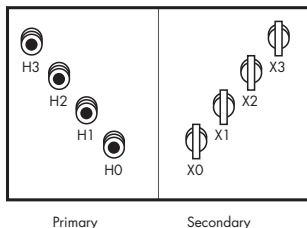
primary to ground  
OPEN



from primaries to  
secondaries OPEN  
OK if both primary and  
secondary have one  
grounded bushing

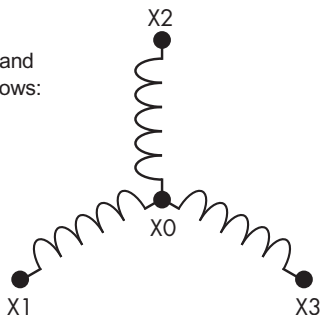
Remove secondary ground strap to verify primary isolated from secondary with OPEN indication.

For 3Ø transformers, the CT-300 test leads are connected from each phase to neutral and across each pair of phases. When all connections are proper and the transformer itself is good, the CT-300 will beep and show OK. The OPEN indication indicates a bad connection or an open transformer winding. A SHORT indication indicates a short from phase to neutral or phase to phase in the transformer or the connections to it.



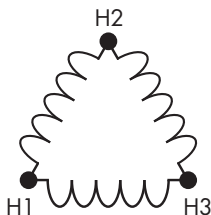
For Y (wye) connections, test the primary and secondary sides of the transformer as follows:

X1 - X2	OK
X2 - X3	OK
X1 - X3	OK
H1 - H2	OK
H2 - H3	OK
H1 - H3	OK
H1 - H0	OK
H2 - H0	OK
H3 - H0	OK
H1 - X1	Transformer OK if both H0 and X0 are grounded, otherwise OPEN
H2 - X2	
H3 - X3	
H0 - X0	SHORT, if both sides are grounded, otherwise OPEN



Y Connection

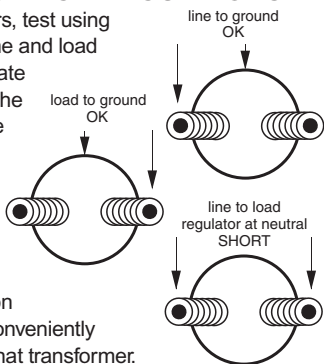
For Δ (delta) connections, test the primary and secondary sides the same as the Y (wye) except omit the connections to X0 and H0.



Delta Connection

## TESTING DISTRIBUTION VOLTAGE REGULATORS

For typical distribution voltage regulators, test using these figures as guidelines. Both the line and load bushings tested to ground should indicate the reading shown in the figures. With the regulator in the neutral position, the line and load are internally connected with the resulting test indicating SHORT.



## TESTING DISTRIBUTION TRANSFORMERS FROM METER SOCKETS

An overhead or underground distribution transformer can sometimes be more conveniently tested from a meter socket served by that transformer.

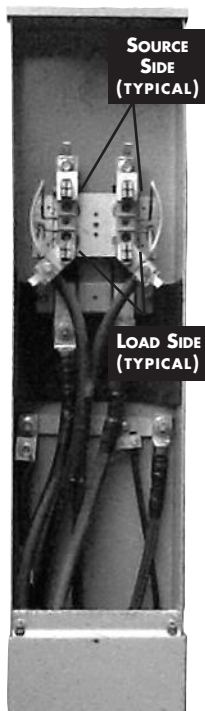
The CT-300 shall only be used on equipment known to be deenergized. Test both the load and source sides of the meter socket for the presence of voltage before using the CT-300.

Using the CT-300 on the secondary side of transformers may generate high voltages on the primary side. Stay clear of all primary connections while testing. The CT-300 will test the secondary side of a transformer connected to the meter socket. Connect the CT-300 across the two source side receptacles and from each receptacle to ground and test.

**NOTE:** This procedure will not work if other loads are connected to the same transformer.

The wiring on the load side of the meter socket going into the main breaker can also be tested for shorts or crossed phases. Connect the CT-300 across the two load side receptacles and from each receptacle to ground. The absence of shorts or crossed phases will be indicated by an OPEN reading. If the main breaker is not open, connected loads within the building may cause a SHORT or OK indication.

The meter socket connections shown are typical. Local standards may specify different connections.



## BATTERY REPLACEMENT

The CT-300 is powered by two 9V lithium or alkaline batteries. They are easily and quickly replaced by removing the battery cover on the back of the unit. Always replace the two batteries together.

**NOTE:** For user safety there is a non-replaceable 600V internal fuse inside the instrument. If the instrument is connected to an energized transformer, the fuse will blow. The instrument must then be returned to the factory for repair.

## DIMENSIONS

4.0 in. W x 7.8 in. L x 2.3 in. H (10.1 cm x 19.5 cm x 5.9 cm)

## WEIGHT

1.6 lbs, (727 g)

## BATTERY

9V alkaline 1604A, IEC 6LR61 or 9V lithium ANSI-1604LC

SHORT: Power factor < 0.3 to 0.5, current dependent

OPEN: Current < 10  $\mu$ A

TRANSFORMER OK: Power factor  $\geq$  0.3 TO 0.5, current dependent

## ENVIRONMENTAL CONDITIONS

CONDITIONS: Indoor and outdoor use

ALTITUDE: Up to 6,566 ft. (2000M)

OPERATING TEMPERATURE: -20°F to +140°F (-29°C to +60°C)

HUMIDITY: 95% to +60°C (non-condensing)

POLLUTION DEGREE: PD2

ENCLOSURE MATERIAL: ABS UL 94-HB

PRINTED CIRCUIT BOARDS: FR-4 UL 94-V0

## REPAIRS

If any damage is found please contact us at 800-435-0786 to arrange for service.

### ClearTest Transformer Tester CT-300

**WARNING:** Use Only on Equipment Known to be Deenergized and/or Discharged. To test leads and internal fuse, short leads together and check for blinking SHORT light. Connect the test leads to the device under test. Push the test button and observe the lights. An OK indication verifies no direct shorts or opens. OPEN indicates an open connection or a high resistance leakage path. SHORT indicates a very low resistance. Using this tool on the secondary side of transformers may generate high voltages on the primary side. Refer to instructions. Check the batteries if the unit fails to operate. Replace with 9V alkaline or lithium types only. This unit contains a 600V fuse which is not replaceable. Return to factory for service.

**DANGER:** Failure to follow these directions or the instructions may expose the user to high voltage, severe injury or death.

HD Electric Company, Waukegan, IL U.S.A.  
www.HDElectricCompany.com



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# TERMS AND CONDITIONS OF SALE

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**1. PRICES AND TAXES:** 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 or which Seller is otherwise required to pay or collect in connection with the sale, purchase, delivery, storage, processing, use or consumption of Goods (but excluding any tax on Seller's net income or profit) shall be 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 demand further performance under this and/or other agreements with the Buyer in the event Buyer fails to make any payment when due, which other agreements Buyer and Seller hereby amend accordingly, or HDE otherwise deems itself insecure. Buyer shall be liable for all expenses, including attorneys' fees, relating to the collection of past due amounts. Should Buyer's financial responsibility become unsatisfactory to HDE, cash payments or security satisfactory to HDE may be required by HDE for future deliveries and for the goods theretofore delivered. If such cash payment or security is not provided, in addition to HDE's other rights and remedies, HDE may discontinue deliveries. HDE may apply a finance charge for payments made by credit card.

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**4. HDE LIMITED WARRANTY:** HDE covers its products with a manufacturer's warranty against defects in material or workmanship for a period of ten years in the case of Capital Controls and in all other circumstances for a period of one year, unless otherwise stated by HDE in writing. To take advantage of this warranty, the complete product must be delivered prepaid to HDE or any HDE Authorized Service Center. This warranty shall not apply to any Goods including but not limited to products which: (a) Have been repaired or altered outside HDE's factory (or Authorized Service Center) or in any manner so as, in HDE's judgment, to affect its serviceability or proper operation; (b) Have been subjected by persons other than HDE (or Authorized Service Center) to improper handling, operation, maintenance, repair or alteration; and, (c) Have been subjected to normal wear and tear, misuse, negligence, improper installation or accident. 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 defective Goods or issuance of credit. HDE requires the return of any alleged defective Goods for inspection and repair, before honoring any claim. All returned Goods are subject to inspection, and if examination does not disclose any defect covered by this warranty, replacement of such Goods or issuance of credit for same will not be approved. THE FOREGOING CONSTITUTES HDE'S SOLE WARRANTY RESPONSIBILITY AND BUYER'S EXCLUSIVE REMEDY WHETHER SHOWN IN TORT, CONTRACT, STRICT LIABILITY OR OTHERWISE, EXCEPT AS OTHERWISE EXPRESSLY SET FORTH IN THIS AGREEMENT. THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, WHETHER OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE. No employee, agent, dealer, or other person is authorized to give any warranty or oral or written statement in addition to or in derogation of the foregoing. This warranty extends only to persons or organizations who purchase the Goods from HDE for resale.

**5. LIMITATION OF REMEDY AND LIABILITY; THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF THIS WARRANTY HEREUNDER SHALL BE LIMITED TO REPAIR, CORRECTION, REPLACEMENT OR CREDIT UNDER SEVERAL CONDITIONS. HDE SHALL NOT BE LIABLE FOR DAMAGES OF ANY KIND OR NATURE, AND IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE), SHALL HDE'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXCEED THE PRICE PAID BY BUYER FOR THE SPECIFIC GOODS GIVING RISE TO THE CLAIM OR CAUSE OF ACTION, AND BUYER SHALL INDEMNIFY HDE FOR ANY DAMAGES IN EXCESS THEREOF. BUYER AGREES THAT IN NO EVENT SHALL HDE'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS INCLUDE SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES OF ANY CHARACTER IN CONNECTION WITH THE SALE, RESALE OR USE OF THE GOODS, WHICH ARE WAIVED BY BUYER AND AS TO WHICH BUYER SHALL INDEMNIFY HDE. The term "consequential damages" shall include, but not be limited to, loss of anticipated profits, business interruption, loss of use of revenue, cost of capital or loss of or damage to property, equipment, or data, or loss of reputation. Further, Buyer shall indemnify and hold HDE harmless from any liability to Buyer, Buyer's employees, workers, contractors or any other persons arising out of Buyer's, and any other persons', use of the Goods. All instructions and warnings supplied by HDE will be passed on to those persons who use the Goods. HDE's Goods are to be used in their recommended applications and all warning labels adhered to the Goods by HDE shall be left intact. It is impossible to eliminate all risks associated with the use of the Goods. 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 Goods 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 HDE. HDE does not agree to be an insurer of these risks, and shall have no liability for any claims arising from such risks. WHEN YOU BUY OR USE THESE PRODUCTS, YOU AGREE TO ACCEPT THESE RISKS.**

**6. EXCUSE OF PERFORMANCE (FORCE MAJEURE):** HDE shall not be liable for delays in performance or for non-performance due to acts of God, acts of Buyer, war; fire, flood, weather; sabotage; strikes; labor disputes; civil disturbances or riots; governmental requests, restrictions, allocations, laws, regulations, orders or actions; unavailability of or delays in transportation; default of suppliers; 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 unaltered. HDE determines that its ability to supply the full demand for the Goods, or to obtain material used directly or indirectly in the manufacture of the Goods, is hindered, limited or made impracticable due to causes set forth herein. HDE may declare 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 purchases on such basis as HDE determines to be equitable without liability for any failure of performance which may result therefrom.

**7. CHANGES:** HDE reserves the right to change designs and specifications for standard Goods without prior notice to Buyer, but not with respect to custom Goods being made for Buyer. HDE shall have no obligation to install or make such change in any Goods manufactured prior to the date of such change.

**8. 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.

**9. INSTALLATION:** Buyer shall be responsible for receiving, inspecting, testing, storing, installing, starting up and maintaining all Goods.

**10. INSPECTION/TESTING:** Buyer, at its expense, agrees that it will promptly inspect the Goods upon receipt thereof, and in no event later than thirty (30) days from the date of receipt of the Goods. Buyer shall deliver to HDE within fifteen (15) days of inspection, but in no event later than forty-five (45) days from the date of receipt of the Goods, written notice of any and all deficiencies, defects, variations from specifications or complaints of any kind with respect to the quantity, quality, condition, shipment, performance, price or appearance of the Goods so received by Buyer. In the event no such written notice is received by HDE, Buyer shall be deemed conclusively to have inspected and accepted all such Goods unconditionally and to have waived any and all rights and claims, including without limitation any right to reject the Goods or to claim damages in respect thereof. Buyer may not return goods without first advising HDE of the reasons therefor, obtaining from HDE a material authorization number and observing such instructions as HDE may give in authorizing such return. In the event a return is authorized by HDE, a restocking for any Goods requiring repackaging or maintenance a twenty percent (20%) restocking fee shall be assessed to Buyer in the final credit amount.

**11. SERVICES:** If its agreement requires HDE to perform or provide any services, HDE (including without limitation its successors, assigns, agents or any person or entity acting at HDE's direction) shall not be responsible for any damages, claims, liabilities or expenses of any nature arising out of such services.

**12. U.S. EXPORT CONTROL LAWS:** All Goods sold to Buyer by HDE hereunder are subject to U.S. Export Control Laws. Buyer hereby agrees not to sell or divert any goods contrary to such laws.

**13. COMPLIANCE:** Seller/Contractor shall comply with all applicable federal, state or local laws, regulations, or orders. Seller/Contractor shall comply with Executive Order 11246, as amended by Executive Order 11375, and the applicable provisions of the Office of Federal Contract Compliance Programs (OFCCP), 41 CFR Part 60, which are incorporated herein by this reference. Buyer shall comply with all applicable federal, state, or local laws, rules, regulations or orders including but not limited to the Foreign Corrupt Practices Act of 1977, as amended. HDE reserves the right to reject or refuse delivery of requests for reasonable assurances of Buyer's compliance are not tendered as requested.

**14. MISCELLANEOUS:** These terms and conditions supersede all other communications, negotiations and prior oral or written statements regarding the subject matter hereof. No change, modification, rescission, discharge, abandonment, or waiver of these terms and conditions shall be binding upon HDE unless made in writing and signed on its behalf by its duly authorized representative. No conditions, usage or trade, course of dealing or performance, understanding or agreement purporting to modify, vary, explain, or supplement these terms and conditions shall be binding unless hereafter made in writing and signed by Seller. No modification shall be effected by HDE's receipt or acceptance of Buyer's purchase orders, shipping instructions forms, or other documentation containing terms at variance with or in addition to those set forth herein, all of which are objected to by HDE. Any such modifications or additional terms are specifically rejected by HDE. No waiver by HDE with respect to any breach or default of any right or remedy or any course of dealing, shall be deemed to constitute a continuing waiver of any other breach or default of any other right or remedy, unless such waiver be expressed in writing and signed by HDE. All typographical or clerical errors made by HDE in any quotation, acknowledgment or publication are subject to correction. Validity and performance relating to the interpretation and effect of this agreement shall be governed by the laws of the state of Illinois without regard to its conflict of law principles.

**15. DISPUTE RESOLUTION:** In the event of any dispute INCLUDING, BUT NOT LIMITED TO, BREACH OF 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 WAIVER OR CLASS ACTION TRIALS 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 LITIGATE 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 of arbitration is not to be chosen by Buyer or Seller of actions arising in connection herewith shall be only in the state of Illinois and the parties agree to such jurisdiction. No action, regardless of form, arising out of transactions relating to 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: The binding arbitration shall be administered by the American Arbitration Association ("AAA") in accordance with its Commercial Arbitration Rules and/or Supplementary Procedures for Consumer-Related Disputes (including those that may be revised from time to time) which is governed by the Federal Arbitration Act ("FAA") (9 USC § 1, et seq.) and will govern the interpretation and enforcement. The binding arbitration shall be held at a location determined by AAA or at such other location as mutually agreed. In addition to the terms stated above, the following will apply to the binding arbitration: (1) the arbitrator, and not any federal, state, or local court or agency, will have exclusive authority to resolve any dispute relating to the interpretation, applicability, enforceability or formation of this Agreement including any claim that all or any part of this Agreement is void or voidable; (2) the arbitrator shall apply Illinois law consistent with the FAA.

HD Electric Company is committed to ongoing review and improvement of its product lines, and thus reserves the right to modify product design and specifications without notice.

HD Electric Company® products are available through HDE® sales representatives worldwide.

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