

# ClearTest<sup>®</sup>

## TRANSFORMER TESTER CT-300

### *WITH AUTOMATIC SELF TEST*

## Operating & Instruction Manual



**HDE** HD ELECTRIC COMPANY  
A Textron Company

1475 Lakeside Drive • Waukegan, Illinois 60085 U.S.A. • 847.473.4980  
fax 847.473.4981 • website: [www.HDElectricCompany.com](http://www.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 Company • Waukegan, IL. 60085, 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.

## TESTING THE CLEARTEST TRANSFORMER TESTER

The CT-300 will automatically perform a complete self-test of the batteries, lights, beeper and all electronics every time the TEST button is pushed 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 3 $\phi$  transformers, refer to the following page.

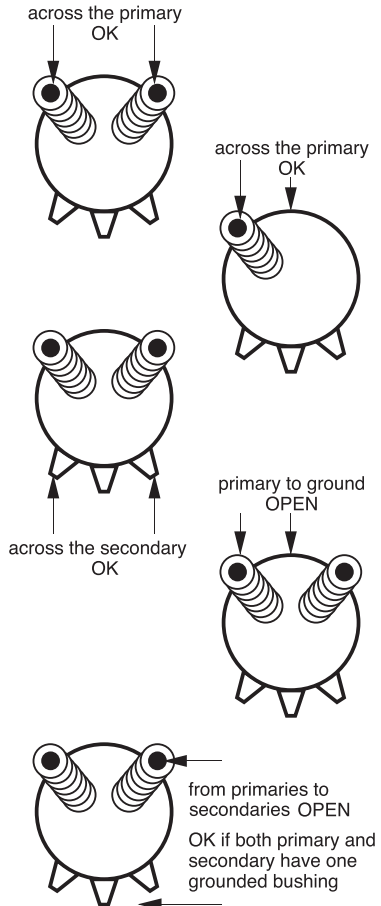
When all connections are proper and the transformer itself is good, the CT-300 will beep and show OK. The OPEN indication light indicates a bad connection or an open transformer winding. A SHORT light indicates a short from phase to neutral or phase to phase in the transformer or the connections to it.

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

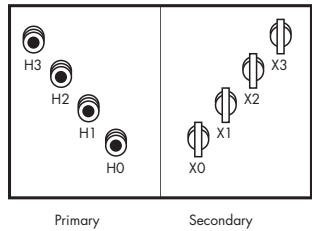
As a quick test in the shop, the CT-300 can be used to screen transformers by checking both primary and secondary windings and connections. Test for SHORTs on both primary and secondary windings and from primary to secondary. Test for OPENs on both primary and secondary windings to check for open windings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

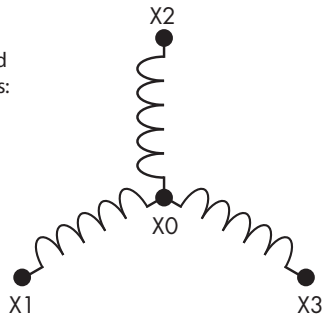


For 3Ø transformers, the CT-300 test leads are connected from each phase to neutral and across each pair of phases. When all connections are proper and the transformer itself is good, the CT-300 will beep and show OK. The OPEN indication indicates a bad connection or an open transformer winding. A SHORT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

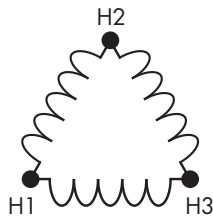


For Y (wye) connections, test the primary and secondary sides of the transformer as follows:

- |         |   |
|---------|---|
| 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

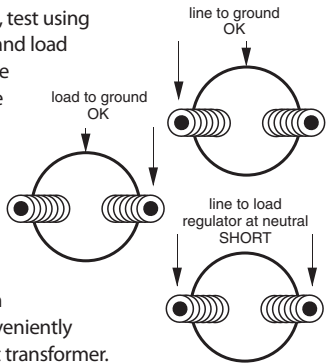


Delta Connection

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

## 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.

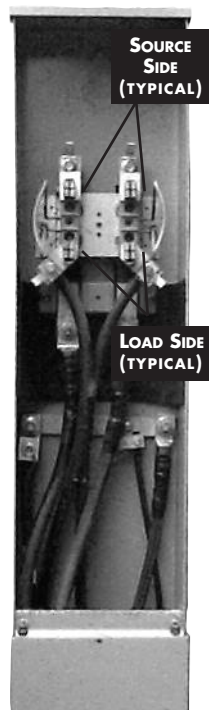
The CT-300 shall only be used on equipment known to be deenergized. Test both the load and source sides of the meter socket for the presence of voltage before using the CT-300.

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

### 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 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.

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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, and shall have no liability for any claims arising from such risks.

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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.

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