

# **TILT II and Quick-Check®**

TRANSFORMER AND  
CAPACITOR TESTERS  
*with Automatic Self-Test*



**HD ELECTRIC COMPANY**

1475 LAKESIDE DRIVE • WAUKEGAN, ILLINOIS 60085 U.S.A.  
PHONE 847.473.4980 • FAX 847.473.4981 • website: [www.HDElectricCompany.com](http://www.HDElectricCompany.com)

# **TILT II and Quick-Check**

TRANSFORMER AND CAPACITOR TESTERS  
*with Automatic Self-Test*



## **SAFETY**

**WARNING:** The TILT II and Quick-Check should be used only on equipment known to be deenergized and/or discharged.

**CAUTION:** Using the TILT II and Quick-Check on the secondary side of transformers may generate high voltages on the primary side. Stay clear of all primary connections while testing.

**The Quick-Check will not leave a significant charge on a capacitor.**

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.

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Quick-Check U.S. Patent No. 6130530

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## **INTRODUCTION**

*The TILT II and Quick-Check are versatile tools for quick and easy checks of transformers and the connections made to them. The Quick-Check also tests power capacitors and capacitor banks. The transformer connections can include bundled secondaries or a cable run from the transformer to the meter.*

*In the field, the testers are used to test the primary and secondary sides of new or reworked, single or three phase transformer installations. The Quick-Check also tests capacitor banks for short or open circuits prior to energizing.*

*In the shop the testers are used for quick screening of incoming and outgoing transformers (including their internal fuses and breakers). The Quick-Check also tests capacitors for both shorts or opens. Both testers test 1Ø and 3Ø transformers including PT's and other instrument transformers, and the Quick-Check tests power capacitors in almost any size.*

## **HOW IT WORKS**

The TILT II and Quick-Check are used in the field for testing connected transformers, their connected primary and secondary leads and the Quick-Check for power capacitors, individually or in banks, for both shorts or opens. Unlike a simple ohmmeter, the TILT II and Quick-Check use a high frequency, low voltage signal to measure transformer winding inductance (and power capacitor capacitance) and they can differentiate true shorts from other low resistance windings or connected equipment such as meters.

**Note:** The TILT II and Quick-Check will not detect a partially shorted transformer coil or an improper transformer ratio. They will not detect a capacitor with a partial short or open.

## **TESTING THE TILT II AND QUICK-CHECK**

The TILT II and Quick-Check will automatically perform a complete self-test of the battery, lights, beeper and all electronics every time the TEST button is pushed. 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 rapidly blinking SHORT light after completion of the normal self-test indicates that the leads and fuse are good.

The automatic self-test will light each of the front panel lights in turn without blinking. The beeper will sound whenever a green light is on. The self-test sequence is OPEN, Capacitor O.K. (Quick-Check only), Transformer O.K. and SHORT. After all of the lights have been on, one of the lights will start blinking rapidly, indicating that the self-test was successful and showing the condition of whatever is connected to the test leads.

If the unit fails to operate, check or replace the battery. 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 TILT II & QUICK-CHECK**

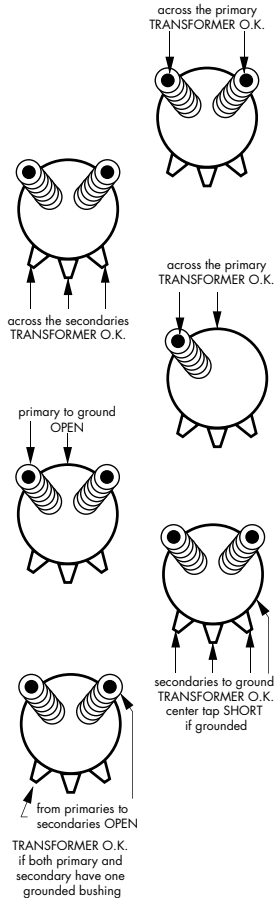
For single phase transformers, use these figures as guidelines to get started. For 3Ø transformers, the TILT II and Quick-Check test leads are connected from each phase to neutral and across each pair of phases. When all connections are proper and the transformer itself is good, the TILT II and Quick-Check will beep and show TRANSFORMER O.K. The OPEN indication designates a bad connection or an open transformer winding. A SHORT indication designates 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.

For the Quick-Check and power capacitors, tests across the two bushings should show CAPACITOR O.K. On a single bushing capacitor tests from bushing to ground will also show CAPACITOR O.K. On a two bushing capacitor, tests from bushing to ground should show OPEN.

As a quick test in the shop, the TILT II and Quick-Check 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. Tests for power capacitors with the Quick-Check are performed across each bushing and from bushing(s) to ground.

**TEST CONNECTIONS FOR TILT II and Quick-Check**



**These instruments are intended for quick and simple testing of transformers or capacitors and the connections made to them. Do not energize visibly damaged equipment such as a transformer leaking oil or a bulged capacitor even if the TILT II or Quick-Check gives an O.K. reading.**

The TILT II and Quick-Check are powered by an internal 9V alkaline battery. It is easily and quickly replaced by removing the battery cover on the back of the unit.

**WARNING: The TILT II and Quick-Check should be used only on equipment known to be deenergized and/or discharged.**

**CAUTION: Using the TILT II and Quick-Check on the secondary side of transformers may generate high voltages on the primary side. Stay clear of all primary connections while testing.**

**The Quick-Check will not leave a significant charge on a capacitor.**

**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.

### **SPECIFICATIONS**

SHORT:  $\leq 10\Omega$ , varies with battery voltage

OPEN:  $\geq 10\Omega$ , varies with battery voltage

TRANSFORMER O.K.: minimum inductance 800 $\mu$ H

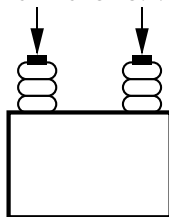
CAPACITOR O.K.: (Quick-Check only)  
minimum capacitance 0.5 $\mu$ f  
maximum capacitance 300 $\mu$ f

### **TESTING 3Ø TRANSFORMERS**

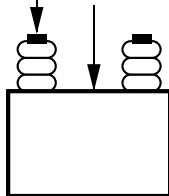
The TILT II and Quick-Check should be used only on equipment known to be deenergized. Using the TILT II or Quick-Check on the secondary side of transformers may generate high voltages on the primary side. Stay clear of all primary connections while testing.

### **TEST CONNECTIONS FOR Quick-Check Only**

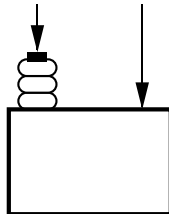
across two bushings  
CAPACITOR O.K.



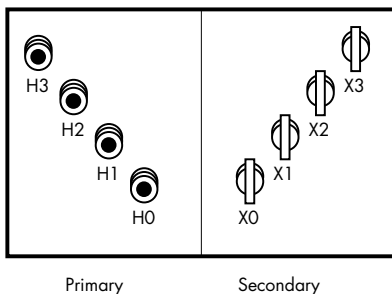
one bushing to ground  
OPEN



one bushing  
CAPACITOR O.K.

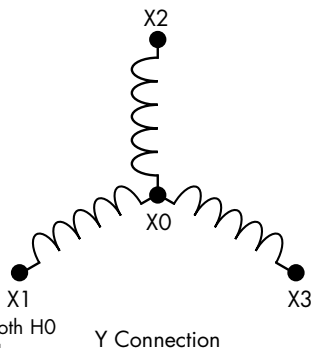


For 3Ø transformers, the TILT II or Quick-Check test leads are connected from each phase to neutral and across each pair of phases. When all connections are proper and the transformer itself is good, the TILT II or Quick-Check will beep and show O.K. The OPEN indication designates a bad connection or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



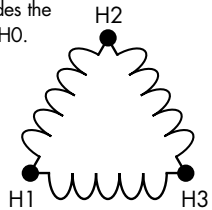
For Y (wye) connections, test the primary and secondary sides of the transformer as follows:

- |         |   |
|---------|---|
| X1 - X2 | Transformer O.K.  |
| X2 - X3 | Transformer O.K.  |
| X1 - X3 | Transformer O.K.  |
| X1 - X0 | Transformer O.K.  |
| X2 - X0 | Transformer O.K.  |
| X3 - X0 | Transformer O.K.  |
| H1 - H2 | Transformer O.K.  |
| H2 - H3 | Transformer O.K.  |
| H1 - H3 | Transformer O.K.  |
| H1 - H0 | Transformer O.K.  |
| H2 - H0 | Transformer O.K.  |
| H3 - H0 | Transformer O.K.  |
| H1 - X1 | Transformer O.K. if both H0<br>and X0 are grounded,<br>otherwise OPEN |
| H2 - X2 |   |
| H3 - X3 |   |
| H0 - X0 | SHORT, if both sides<br>are grounded, otherwise OPEN                  |



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

The TILT II and Quick-Check will not detect a partially shorted transformer coil or an improper transformer ratio. It is intended for quick and simple testing of transformers and the connections made to them.



Delta Connection

### **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.

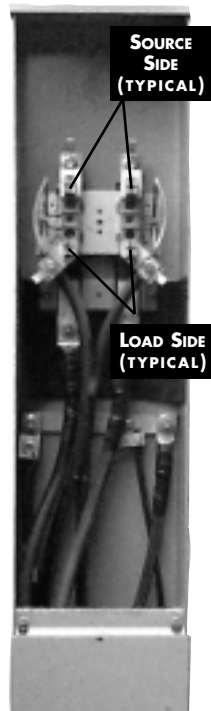
The TILT II and Quick-Check should be used only on equipment known to be deenergized. Test both the load and source sides of the meter socket for the presence of voltage before using the TILT II or Quick-Check.

Using the TILT II or Quick-Check on the secondary side of transformers may generate high voltages on the primary side. Stay clear of all primary connections while testing. The Quick-Check will test the secondary side of a transformer connected to the meter socket. Connect the TILT II or Quick-Check 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.

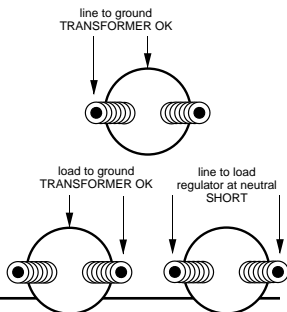
The wiring on the load side of the meter socket going into the main breaker can also be tested for shorts or crossed phases. Connect the TILT II or Quick-Check across the two load side receptacles and from each receptacle to ground. The absence of shorts or crossed phases will be indicated by an OPEN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

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



## **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.



## **LIMITATION OF WARRANTY AND LIABILITY**

NOTICE: READ THIS LIMITATION OF WARRANTY AND LIABILITY BEFORE BUYING OR USING THIS PRODUCT. IF THE TERMS ARE NOT ACCEPTABLE, RETURN THE PRODUCT AT ONCE, AND THE PURCHASE PRICE WILL BE REFUNDED.

It is impossible to eliminate all risks associated with the use of this product. 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 this product 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.

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