VANGUARD

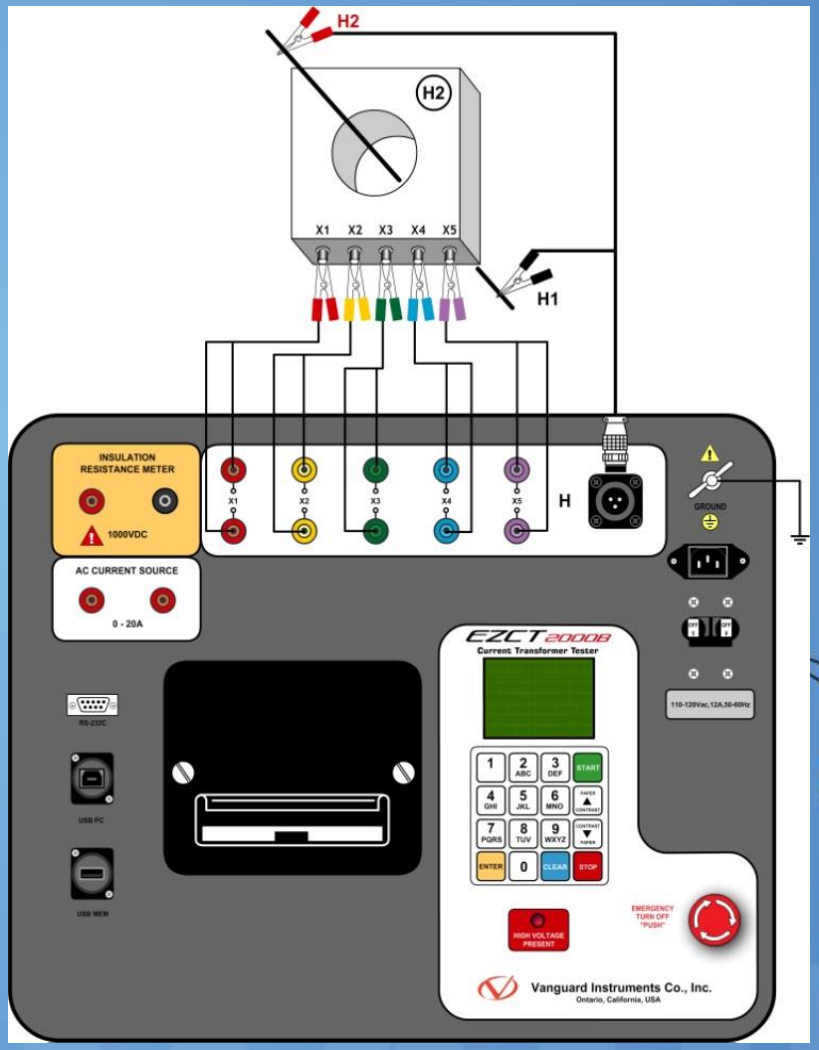
Instruments Company, Inc.

EZCT/EZCT-2000 Turns Ratio Testing Notes

Reliability through instrumentation.

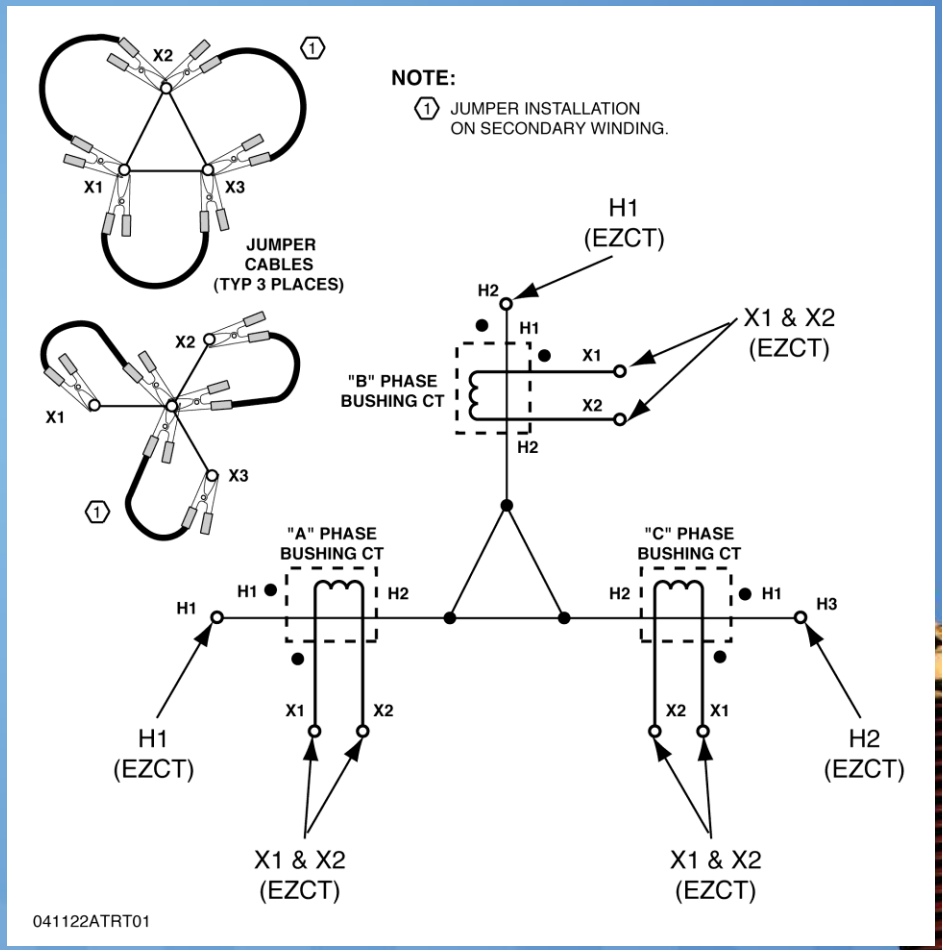
EZCT TURNS RATIO TEST

- The EZCT's use the "Voltage Method" to determine the CT Turns ratio
- The ideal connection is shown in this illustration



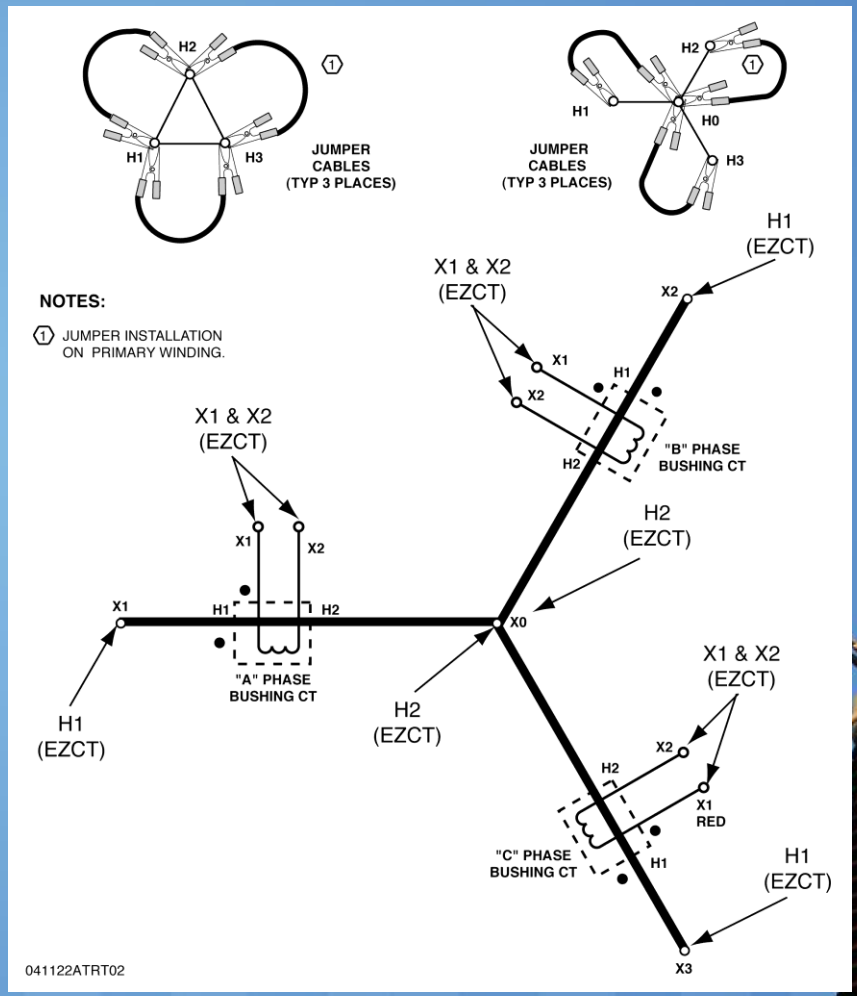
EZCT/EZCT-2000 TURNS RATIO TEST

- When the CT's are mounted on the transformer primary windings, the user needs to install jumpers on the secondary windings to eliminate the Turns-Ratio reading errors
- Typical CT's on the Delta windings is shown here
- Secondary windings are shorted (X bushings are shorted)



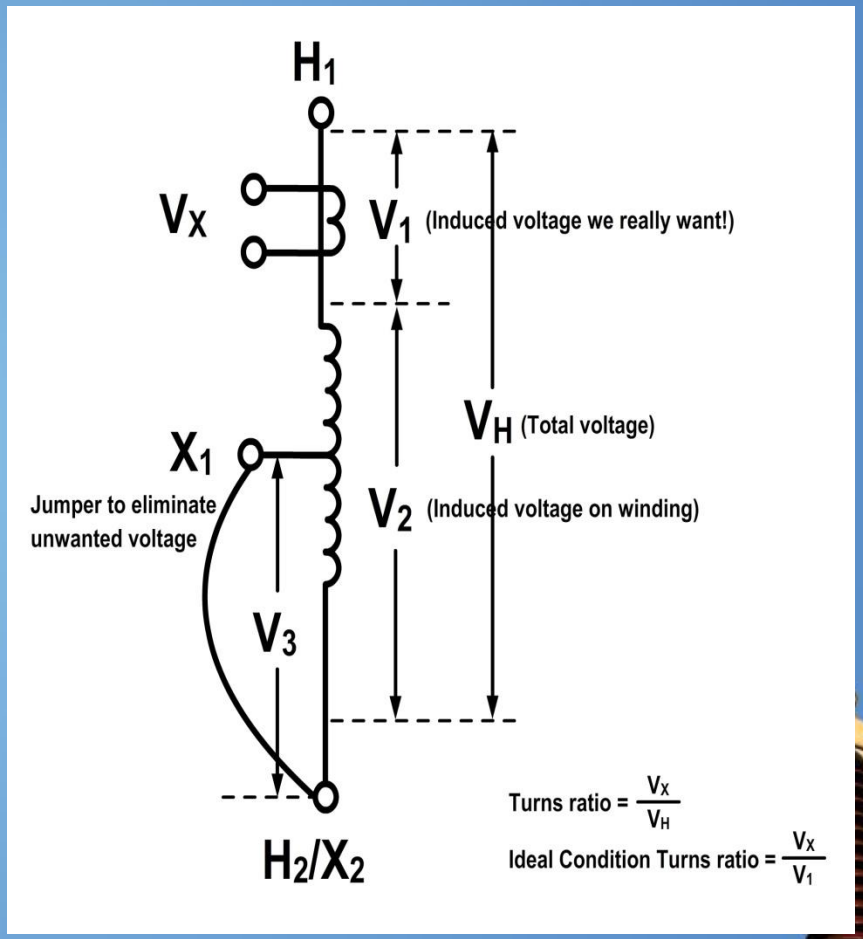
EZCT/EZCT-2000 TURNS RATIO TEST

- When CT's are mounted on the transformer secondary windings, the user needs to install jumpers on the primary windings to eliminate the Turns-Ratio reading errors
- Typical CT's on the Wye windings is shown here
- Primary windings are shown shorted (H bushings are shorted)



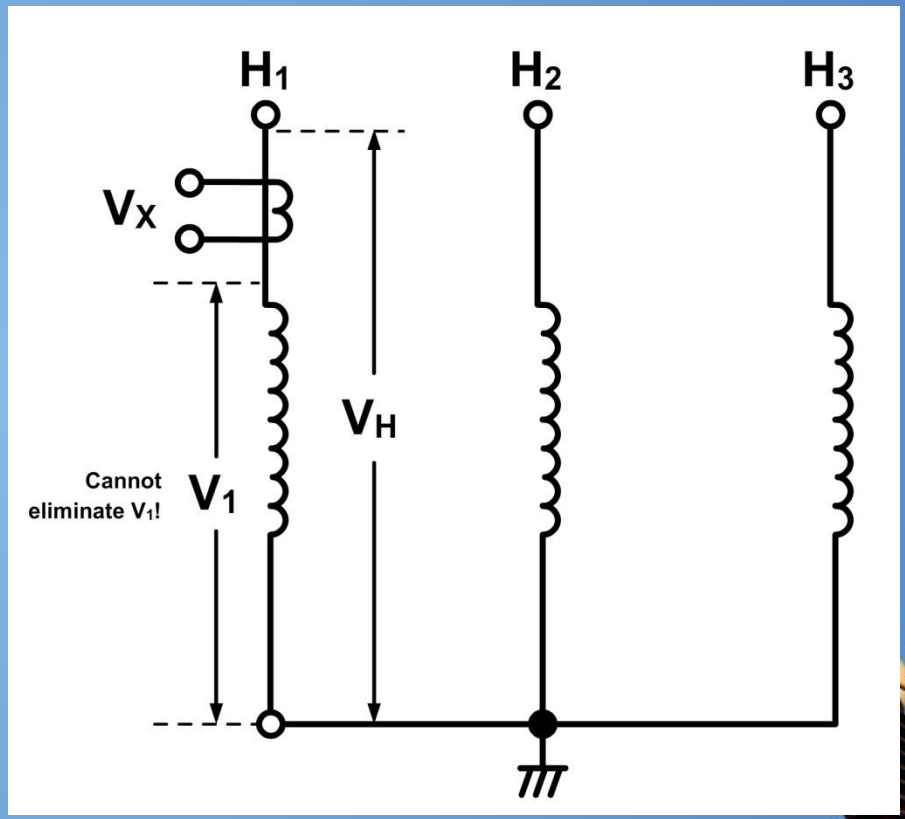
EZCT/EZCT-2000 TURNS RATIO TEST

- A CT mounted on an Auto-Transformer presents an issue
- External jumper will not eliminate all the unwanted induced voltage on the winding
- The turns ratio will be off even with the jumper installed



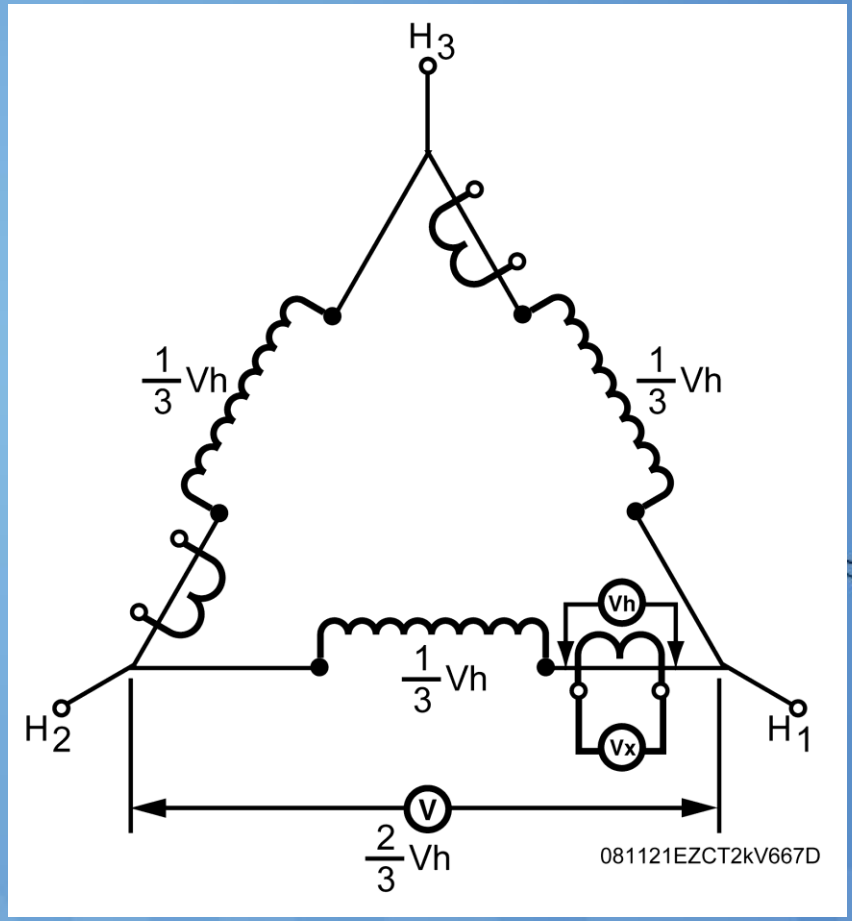
EZCT/EZCT-2000 TURNS RATIO TEST

- A CT mounted on a reactor winding also creates a problem when the user wants to measure the turns ratio
- Since there is no secondary winding that can be shorted to eliminate unwanted voltage (V1), the reading will be off
- If the CT is accessible, the user can run a conductor through the center of the CT to measure the induced voltage to correct the problem



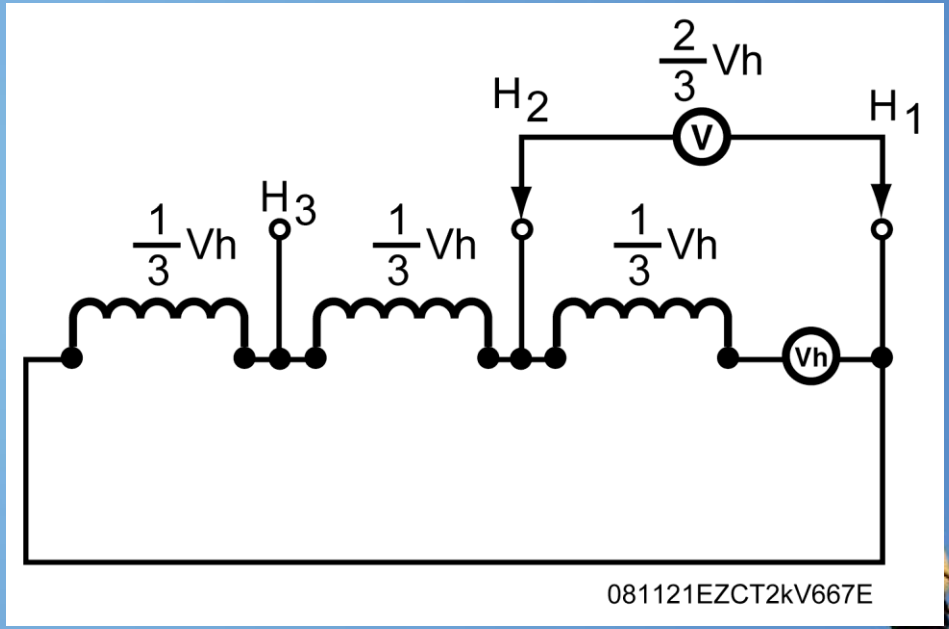
EZCT/EZCT-2000 TURNS RATIO TEST

- Buried CT's inside a Delta winding turns ratio is measured at 3/2 of its nameplate value using the voltage method
- The CT turns ratio is ideally measured as: Ratio = Vx/Vh



EZCT/EZCT-2000 TURNS RATIO TEST

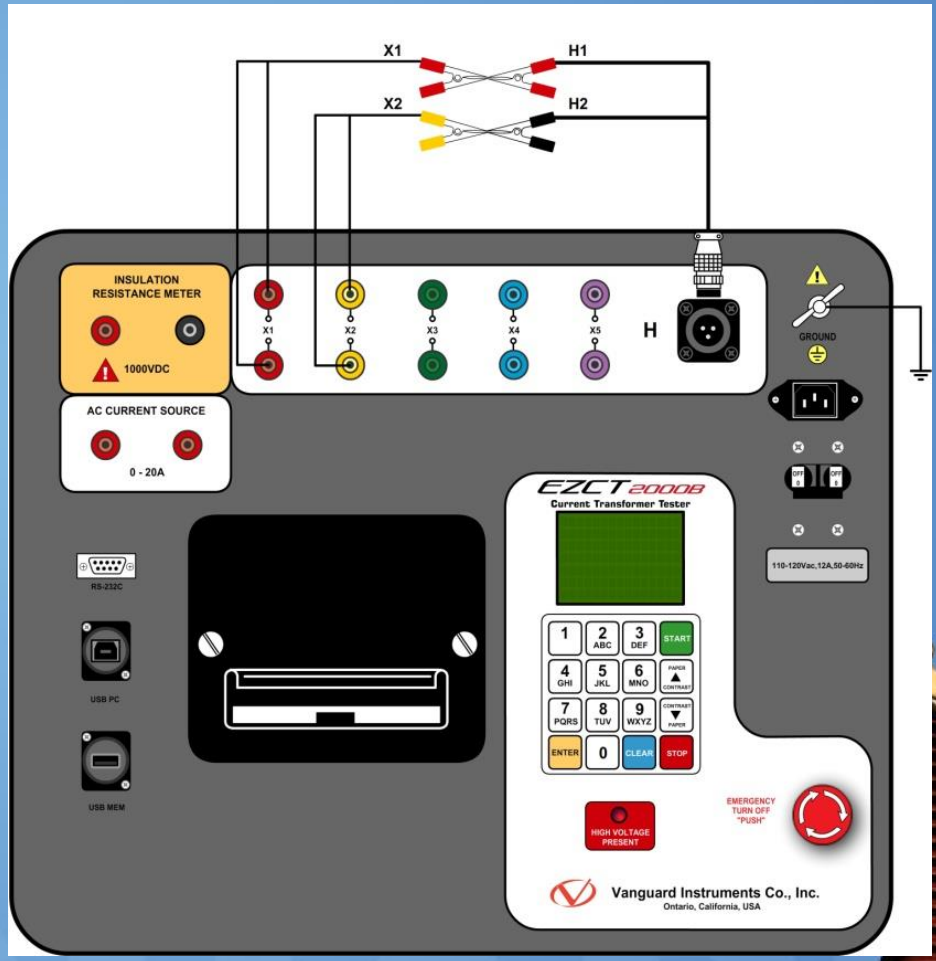
- Since the induced voltage (*V*) is sensed through the H1-H2 terminals of the Delta winding, this induced voltage is measured as *V* = (2/3) *Vh*
- The CT turns ratio is now measured as Ratio =Vx/V or Ratio = (3/2)(Vx/Vh). This measured turns ratio is (3/2) higher than the actual turns ratio
- The EZCT-2000B will display the correct CT turns ratio by adjusting the measured turns ratio by 2/3 when the user select the “Buried CT in Delta” mode



EZCT/EZCT-2000 TURNS RATIO TEST

To perform a self test on the EZCT/EZCT-2000:

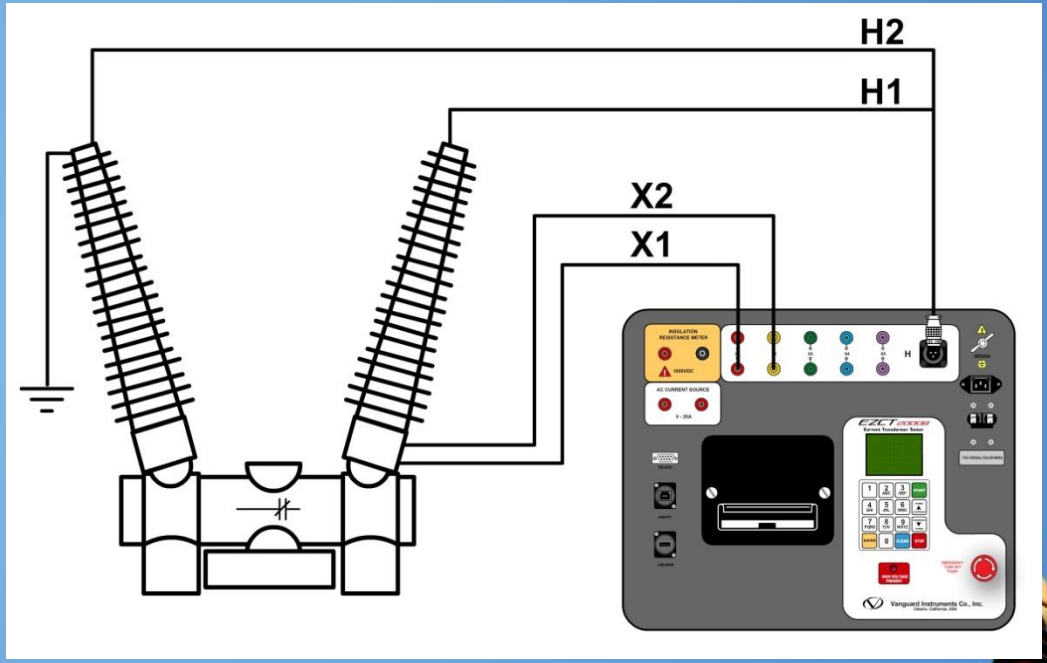
- Connect the H1 lead to the X1 lead
- Connect the H2 lead to the X2 lead
- Run ratio test only on the EZCT/EZCT-2000
- Observe turns ratio display to be +1.000
- Observe polarity to be in-phase
- This test verifies the EZCT/EZCT-2000's turns ratio circuitry



EZCT/EZCT-2000 TURNS RATIO TEST

If the turns ratio reading of CT's on a CB is off:

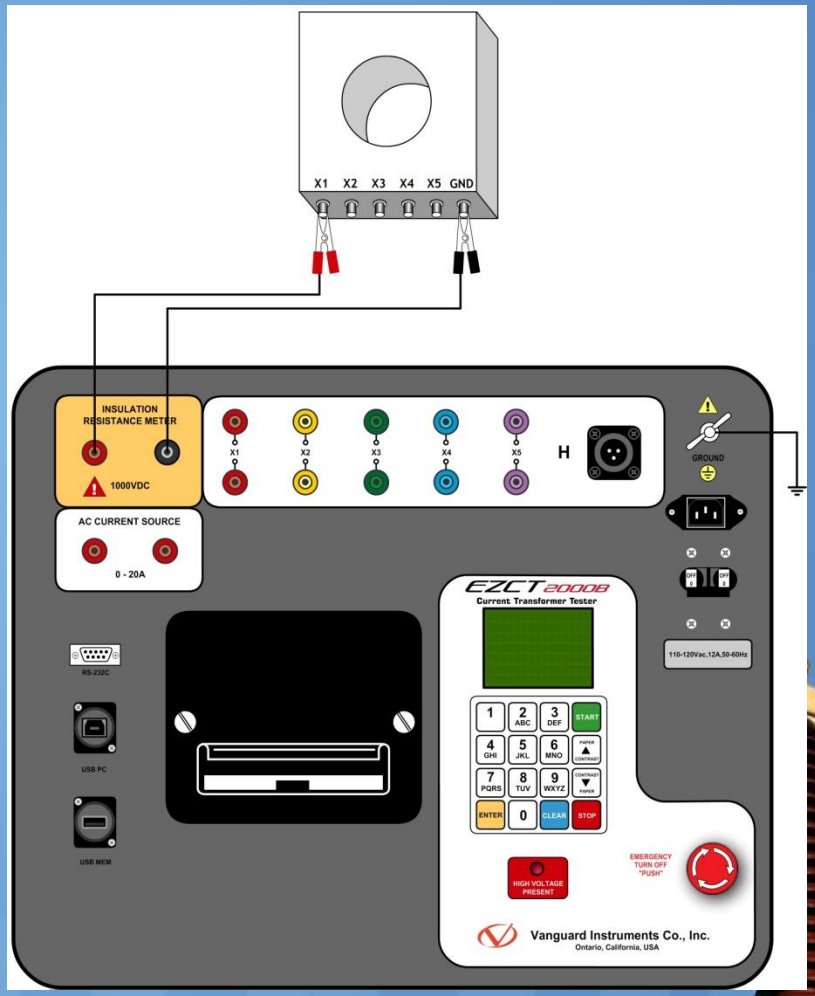
- Check for CB bushing being grounded on both sides
- If one side of the CB bushing is grounded, make sure the EZCT H2 probe is on the grounded bushing
- Check the physical location of the CB in the substation. If you are next to a HV line, your reading may be off



EZCT/EZCT-2000 INSULATION TEST

Insulation Test Connections:

- Isolate all X terminals of the CT from EZCT/EZCT-2000
- Connect “Positive” probe of the EZCT-2000B to any CT X terminal
- Connect “Negative” probe to the CT ground terminal



EZCT/EZCT-2000 POWER SOURCE

- EZCT/EZCT-2000 can be operated using an inverter
- A Pure sine wave inverter output is recommended
- A generator power source may affect the turns ratio and polarity reading readings due to the instability of the AC source.