



VEBKO ONLINE HELP

Introducing “Current Transformer (CT)” Room

Category	tester
Section	Current Transformer Module
Language	English
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One of the instrument which can be tested by "AMT" is current transformer or "CT". "CTs" are very useful for converting the high current of an electrical system to a current measurable by relays and measurement devices. Generally, there are two types of "CTs" including "Measuring" and "Protection". The difference between these two types is in their ratio accuracy or accuracy class as well as saturation level. Since "Measuring" "CT"s are used in measurement devices, when there is a fault, if the current entered this equipment increases too much, the equipment might be damaged. But "Protection" "CTs" are used in relays and since the performance of a relay is in accordance with the amount of fault current, these "CTs" should be able to move the fault current of the network to the secondary with the least possible error.

In drawing the equivalent circuit of this transformer, the "CT" turns ratio is "1:N". " R_p " and " X_p " equal the "CT" transformed to the secondary while " X_s " and " R_s " indicate the resistance and "CT" secondary leakage flux. In parallel branch, " R_e " and " R_h " are indicators of losses of eddy current and the hysteresis respectively and " L " indicates the magnetization inductance or "CT" secondary self-inductance. In the equivalent "CT" circuit, unlike normal transformers, the parallel branch is located in the secondary side and this very branch is the reason for core saturation in high currents. Since the primary resistance and leakage flux in "CT" is insignificant, " R_p ", " X_p " and " X_s " can be ignored.

By clicking on "Current Transformer (CT)" on the start page of the software, the "CT" test room opens. In tests performable by the "AMT 105", R_{CT} , saturation curve and the turn's ratio are achieved with two methods of voltage or current. Moreover, measurement test of the burden connected to the "CT" secondary is performable by this device as well. "Test Object" and "Megger" tabs are used to enter the nominal information of "CT" and the results of "Megger" test respectively.

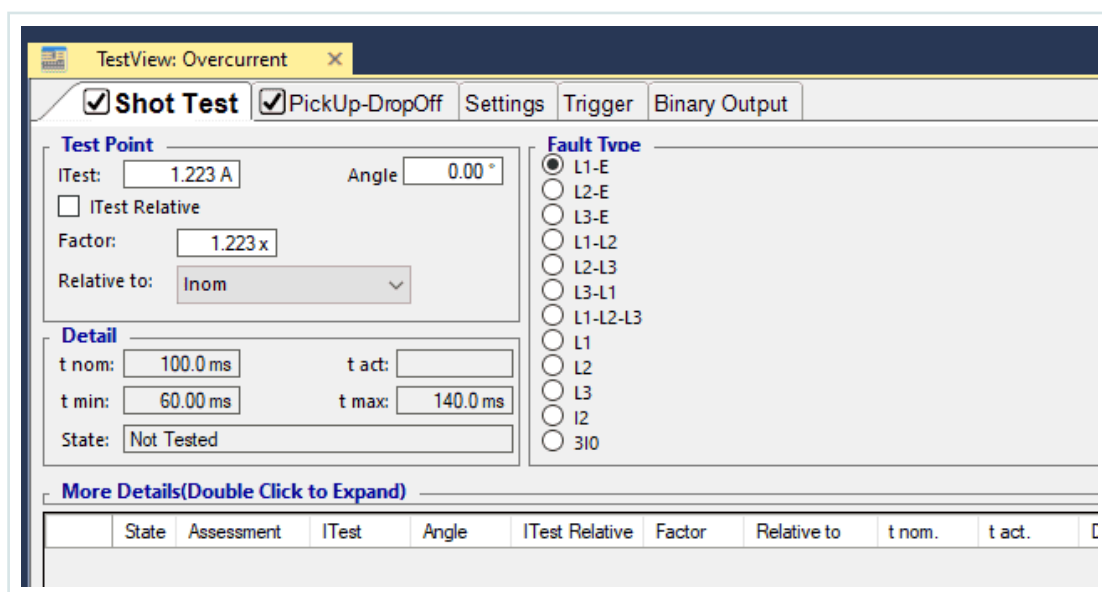


Figure 1

1 "Test Object" Tab:

Any module to be able to perform a test needs some information about the equipment. This information is entered in "Test Object" section. The general information about "CT" which should be recorded in the report is entered in "General Information" section. The company's title, the country, name and the address of the substation and installation place of "CT", title of the manufacturer of "CT", "Type" of "CT", serial number of "CT", title of the feeder on which "CT" is installed, phase number, "IEC" standard number written on the plaque of "CT", number of cores of "CT", number of taps of "CT" and additional information are entered in "Company", "CT Serial Number", "Feeder/Bay", "Phase", "IEC-ID", "Core Number", Tap" and "Additional Information" fields respectively to be added to the report. In "Extra Data" section, the test date in A.D., the information of the performer of the test and the information of the supervisor are entered in "Date", "Tested By" and "Approved By" fields respectively.

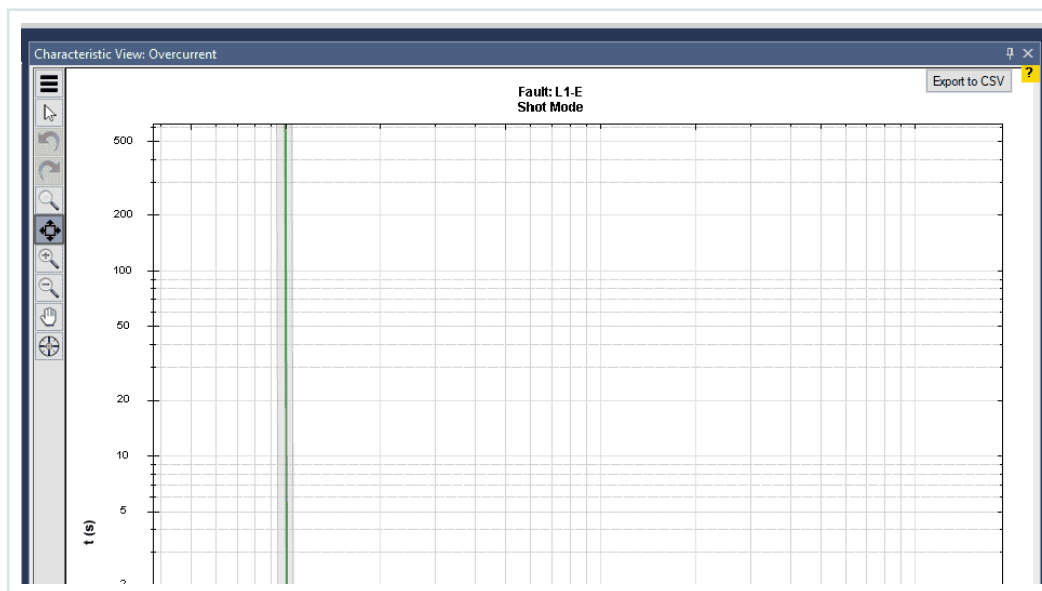


Figure 2

By checking "Easy Mode" option in "Accessories" section, the wiring of the tests changes. This wiring is based on the board designed by Vebko Company for the "CT" test. The mentioned board is located on the front panel of the device and there are some relays placed on it which automatically manage the wirings of the front panel of the device which makes performing the test easier. The main information of the "CT" which has influence on the calculations of knee point and evaluation of the tests are entered in "Test Setting" section. The CT core type is selected from among "Measuring" and "Protection" in "Core Type" field. The accuracy class of the "CT" is specified in "Class" field. If the type of "CT" is "Measuring", the accuracy classes available in drop-down field such as "0.5s" mean that in 100 to 120 percent of the nominal current crossing the primary "CT", there may be measurement fault up to this percentage max. If the "CT" is "Protection" there are different accuracy classes one of which is selected according to the "CT" type and the information required for every "CT" is displayed in "Nominal Values" section.



Figure 3

For example, if "10P or 10Pr" is selected as accuracy class, based on "ALF" in "CT", there may be up to 10 percent error in "ALF" times the primary nominal current. This means that if the "ALF" for a "CT" with an accuracy class of "10P" is "20", in 20 times of the nominal current in the "CT" primary, if the nominal "Burden" is connected to its secondary, there may be up to 10 percent measurement deviation. In "Applied Standard" field, the standard used for the "CT" is determined. In "Class Multiplier" field, a factor is entered between "0.2" and "1" to be multiplied by accuracy class. This factor makes the "CT" accuracy class harder in turns ratio test. This means that if the "CT" accuracy class equals "10P" and its accuracy factor equals "0.8", the maximum "CT" error in "ALF" times the primary nominal current is 8 percent.

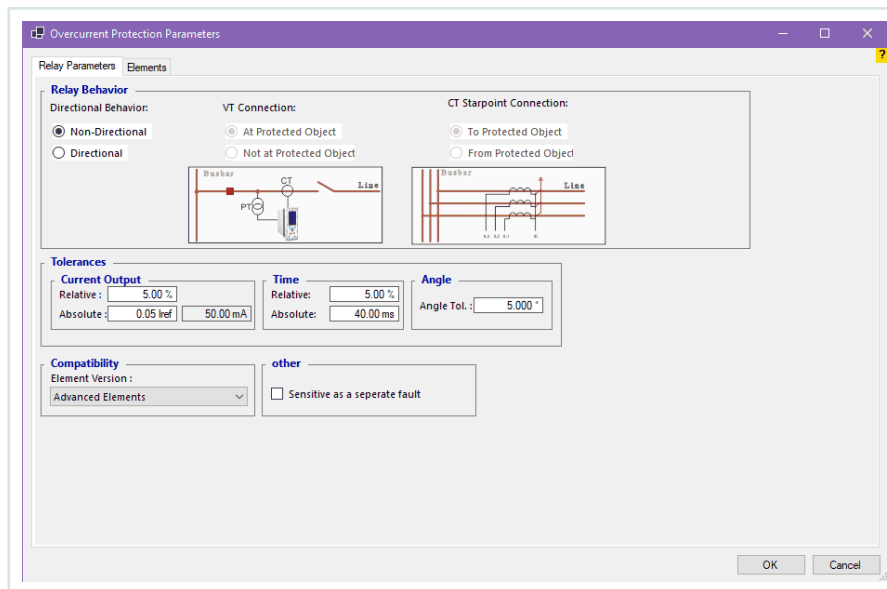


Figure 4

In "Nominal Values" section, the nominal values are entered according to the type and class of the "CT". Primary current, secondary current, nominal frequency, apparent power and secondary resistance in the temperature specified on its plaque (usually 75 degrees) are entered in their related fields. "Fs" or "Security Factor" indicates the measuring "CT" security factor and is defined as the ratio of instrument limit primary current to the rated primary current. Note that the actual "Fs" value is dependent on the burden of the "CT". If the burden connected to the "CT" is lower than its nominal burden, the "Fs" value is increased and the "CT" is saturated in higher current. For example, when the "Fs" of a "CT" is "5", this "CT" is saturated in 5 times the nominal current.

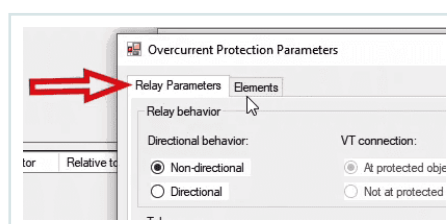


Figure 5

"ALF" or "Accuracy Limit Factor" is defined as the proportion of accuracy limit of the primary current to the nominal current. The value of actual "ALF" is dependent to the burden connected to the protective "CT" secondary and its value decreases as the value of the connected "Burden" increases. "CT" Power factor, apparent power of the actual burden connected to the "CT" and the ambient temperature which equals 25C are entered in "Cos (phi)", "Actual Burden" and "Ambient Temperature" fields respectively. If the "CT" accuracy level is "X or PX", "PXR", "TPX", "TPY" and "TPZ", options such as "Exciting Current (I_e)", " K_{ssc} ", " R_b ", etc. are added to "Nominal Values" section which should be entered from the "CT" plaque. This information is used to estimate the knee point for excitation test. To view how these parameters work you can go to "Excitation Test" tab and by holding the "Mouse" pointer on the estimated knee voltage, view its relation.

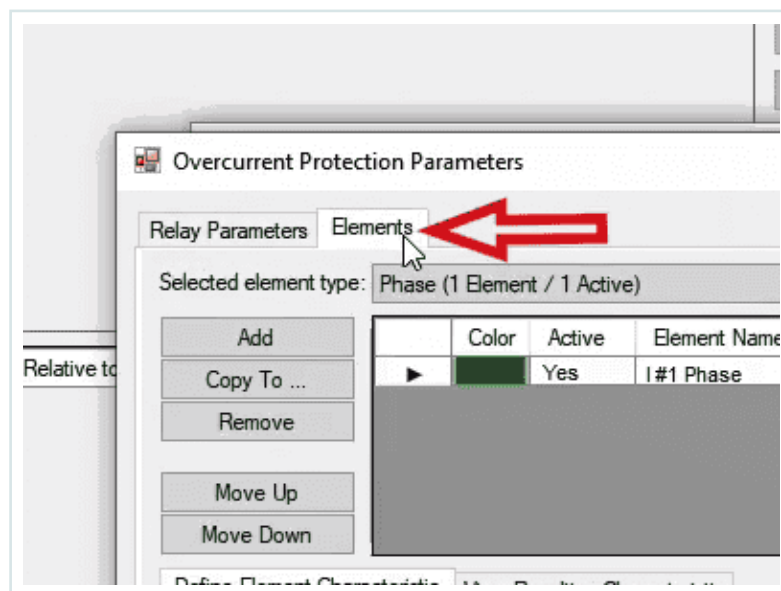


Figure 6

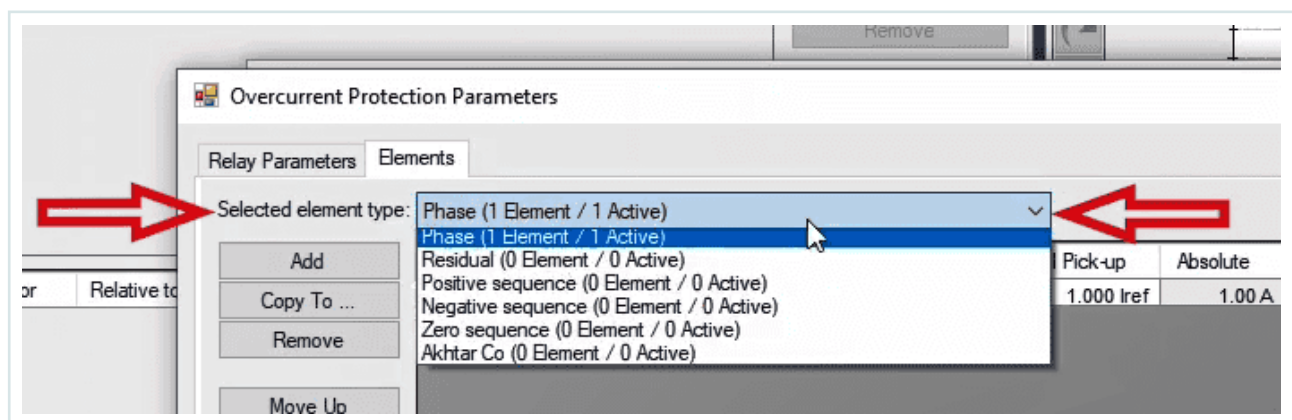


Figure 7

In "Winding Material" field in "Temperature Correction" section, the material used in the coils is

selected from among "Copper" and "Aluminum". In "Winding Temp" field, the current temperature of the "CT" coil is entered. Also, in "Reference Temp." field, the reference temperature is entered to measure the resistance value of the coils so it can be used to correct the values measured in different temperatures. Normally, the reference temperature is written on the "CT" plaque in front of the secondary coil resistance which usually equals 75 degrees. In "Correction Factor" field, the temperature correction factor is calculated in accordance with the ambient temperature, reference temperature as well as the material of the coil which is not editable. In some cases, in the "Test Sheet" which comes with the "CT", the coil resistance is measured in a temperature other than the one mentioned on the plaque. If you wish to enter the value of this resistance, by checking "R Man. (Ref.Temp.)" option, you can enter the resistance. In this case, this resistance and its temperature are considered as the reference and are added to the results table in the "R Man.(Ref.Temp.)" column in "Resistance Test" tab that the temperature which is measured by the manufacturer is based on the resistance and is measured and showed in this test.

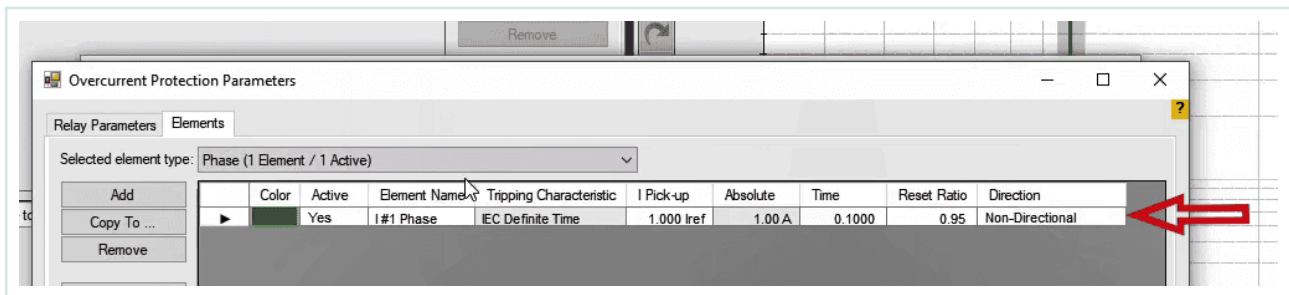


Figure 8

The number entered in "RMS Accuracy" box in "Number of Period" field, shows the number of cycles used for calculation. By default, this number is set at "1". As the number of cycle's increases, the software uses more cycles in "AC" mode and more time in "DC" mode for calculations. By doing so, the number of calculations increases and the software speed is decreased but the result of the test will be more precise.

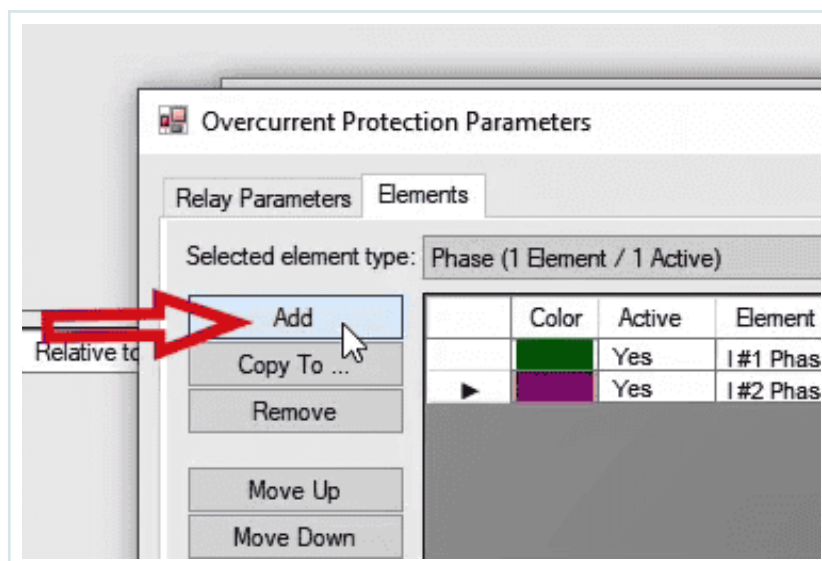


Figure 9

By clicking "Add to Report" option at the bottom of the page, this information is added to the report and then a message saying "The Report was added to the list" is displayed. By selecting "Report" window from the right side strip, it is possible to **view the report**. By clicking on "Delete Report", the report added from "Report" window is removed from "Delete from Report" window. If "Set as default" option is selected, the entered information is saved and set as default and by opening "Current Transformer (CT)" room, this information is displayed. For the instructional videos of this section, a 10P10 protective CT with 500/1 as turns ratio, 50 Hz as frequency and 15 VA as Burden is going to be tested.

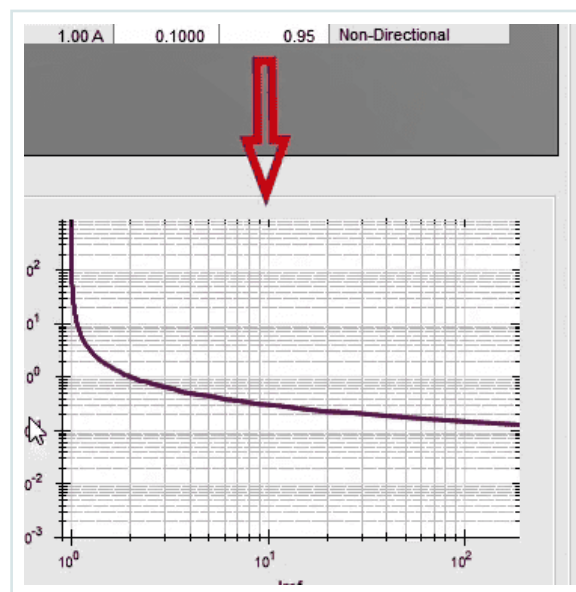


Figure 10

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