

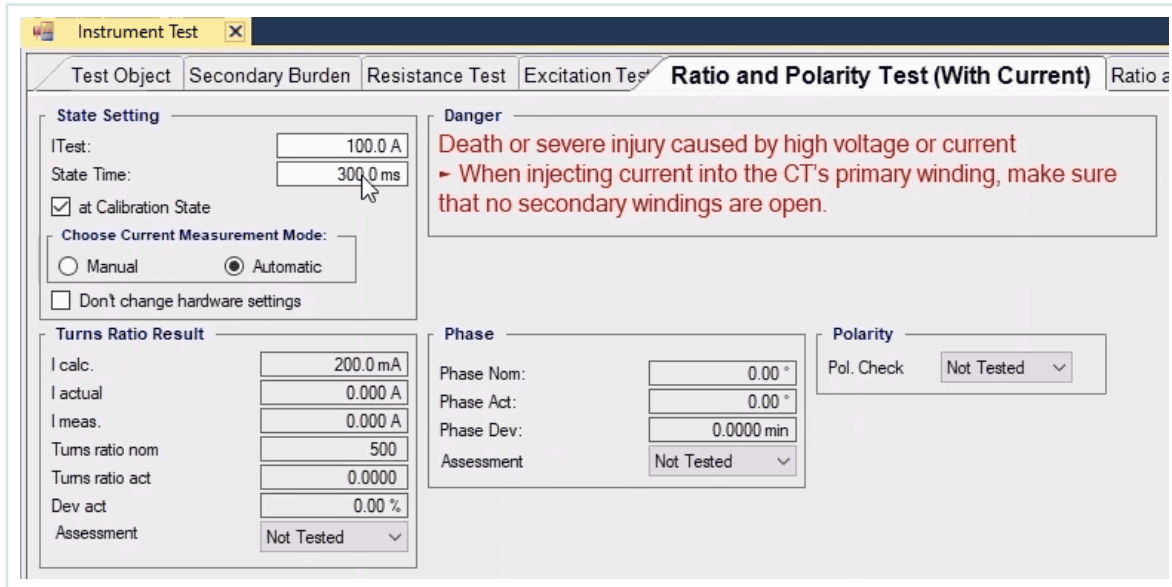


VEBKO ONLINE HELP

CT Ratio and Polarity Test with Current Method

Category	tester
Section	Current Transformer Module
Language	English
Generated	2026-10-18

To perform a ratio and polarity test you should use "Ratio and Polarity Test (With Current)" tab. In this tab, turns ratio, polarity and phase deviation between "CT" primary and secondary is performed where "AC" current is injected and the secondary current is measured through "Input9". To perform this test, you need to enter the current and time of the test in "State Setting", in "I test" and "State Time" fields respectively. Before initiating the test some points must be considered.



The screenshot shows the 'Instrument Test' window with the 'Ratio and Polarity Test (With Current)' tab selected. The 'State Setting' section includes fields for 'I Test' (100.0 A), 'State Time' (300.0 ms), a checkbox for 'at Calibration State', a radio button for 'Choose Current Measurement Mode' (Automatic is selected), and a checkbox for 'Don't change hardware settings'. The 'Turns Ratio Result' section shows calculated values: 'I calc.' (200.0 mA), 'I actual' (0.000 A), 'I meas.' (0.000 A), 'Turns ratio nom' (500), 'Turns ratio act' (0.0000), 'Dev act' (0.00 %), and 'Assessment' (Not Tested). The 'Phase' section shows 'Phase Nom' (0.00 °), 'Phase Act' (0.00 °), 'Phase Dev' (0.0000 min), and 'Assessment' (Not Tested). The 'Polarity' section shows 'Pol. Check' (Not Tested). A warning box at the top right states: 'Danger: Death or severe injury caused by high voltage or current. When injecting current into the CT's primary winding, make sure that no secondary windings are open.'

Figure 1

The first point is that the current limit is "128" amps while the "Binary/Analog Input9" limit is "500" milliamps. But since in sometimes the "CT" secondary current exceeds "500" milliamps which damages the "Input9", "Icalc" is limited to "450" milliamps. This means that you can increase the primary as much as that "Icalc" does not exceed "450" milliamps. The second point is that if the route resistance is too high and the device is not able to provide the needed "Burden", to perform the test you should decrease the resistance. To do so, you can parallel "4" pieces of wire. The third point is that if even by using "4" pieces of wire the problem is not solved, you need to decrease the current. Note that the test current must be based on the standard because the software uses that to assess the test.

The table made in this section is the basic standard for test assessment where the allowed turns ratio error and phase deviation are specified in percent and "minute" for classes of protection and measurements "CTs". In turns ratio section, the allowed error for different percentages of nominal current and in the "phase" section allowed error is specified in minute. For example, for a "Measuring CT" with the class of "0.5", in "5" percent of the nominal current, "1.5" percent turns ratio and "90" minutes of phase deviation error are allowed. But in "Protection" mode, the maximum error is determined independently from the primary current. For example, for a "Protection CT" with the accuracy class of "10P10", the maximum allowed turns ratio error is "3" percent and there is no limitation mentioned for phase deviation.

Error limits for measuring current transformers												
Accuracy class	Ratio error						Phase displacement					
	± %						± Minutes					
	at current (% of rated)						at current (% of rated)					
	1	5	20	50	100	120	1	5	20	50	100	120
0.1	-	0.4	0.2	-	0.1	0.1	-	15	8	-	5	5
0.2	-	0.75	0.35	-	0.2	0.2	-	30	15	-	10	10
0.2S	0.75	0.35	0.2	-	0.2	0.2	30	15	10	-	10	10
0.5	-	1.5	0.75	-	0.5	0.5	-	90	45	-	30	30
0.5S	1.5	0.75	0.5	-	0.5	0.5	90	45	30	-	30	30
1	-	3	1.5	-	1	1	-	180	90	-	60	60
3	-	-	-	3	-	3	Not specified					
5	-	-	-	5	-	5	Not specified					
Error limits for protective current transformers												
Accuracy class	Ratio error at rated primary current		Phase displacement at rated primary current		Transient error limits under Specified duty cycle condition							
	± %		± Minutes		%							
5P and 5PR	1		60		5							
10P and 10PR	3		No limit		10							
PX	0.25		-		-							
PXR	1		-		-							
TPX	0.5		30		ε ⁺ =10							
TPY	1		60		ε ⁺ =10							
TPZ	1		180 ± 18		ε ⁻ ac =10							

Figure 2

After entering the information in "State Setting", you should set the wiring according to the picture. In this wiring, short circuit "Ia1", "Ib1", "Ia2" and "Ib2" together and "Ia3", "Ib3", "Ia4" and "Ib4" together and then according to the picture, connect a wire to "Ia1" and "Ib4" phases after passing it through the "CT". To measure the secondary current, connect "Input9" to "S1" and "S2". After wiring, for "CT Protection 500/1", "10" percent of the nominal current which equals "50" amps and "1" seconds as time are entered and the test runs after "Init Test" is pressed. You can view the "States" created by the software in "Table View". If "At Calibration State" is checked, in the first state (with zero current), the secondary is measured and is deducted from the final result. The second state is the same as the specified test current. Note that if "At Calibration State" is not checked, the noise is not removed from the response. In "Signal View" section, the waveform of the specified current along with its "Actual" values and the current measured by "Input9" can be viewed. After the test is finished, the results can be viewed in "Turns Ratio Results". "Icalc" is the secondary current calculated by the software in accordance with the turns ratio entered in "Test Object" and the "Itest". "Iactual" is the actual value of the injected current, "Imeas" is the measured current and "Turns Ratio Nom" is the "CT" nominal turns ratio. "Turns Ratio Act" is measured by comparing "Imeas" and "Iactual" and finally, the assessment is recorded in "Assessment" field in accordance with the difference between "Turns Ratio Act" and "Turns Ratio Nom"; if "Deviation act." is less than the value specified in the standard, the test "Passes" otherwise it fails. Here, since the fault percentage is less than the value specified in the standard, the test is "Passed".

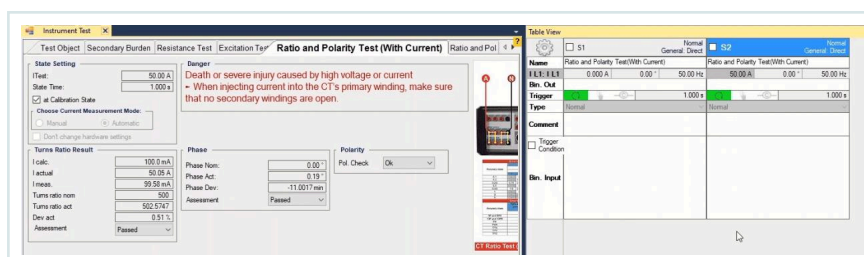
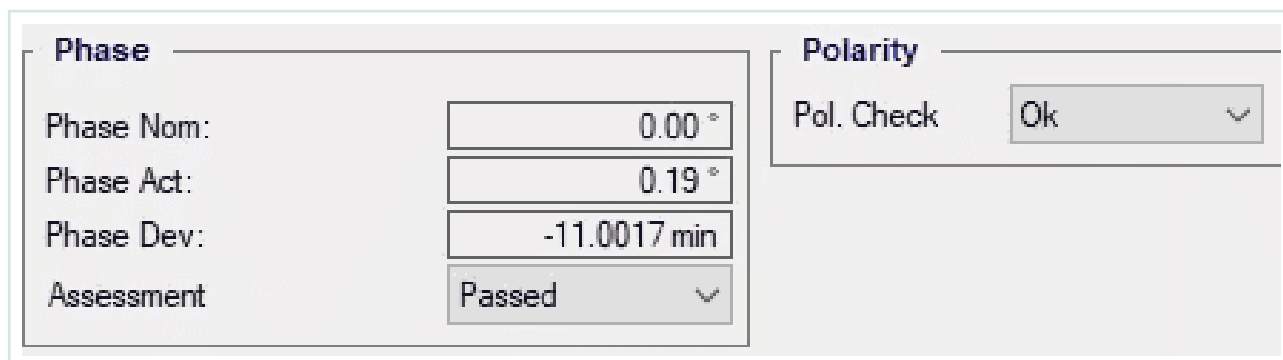


Figure 3

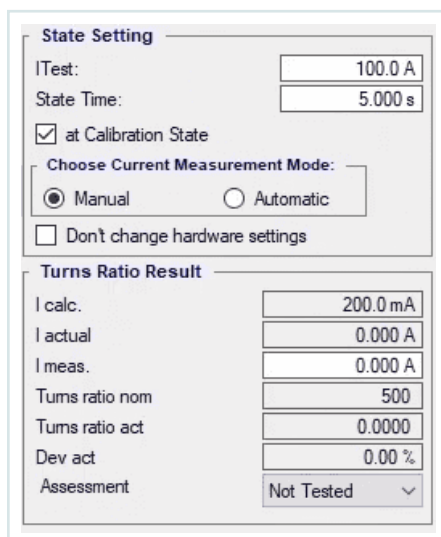
In "Phase" section, In "Phase Nom" and "Phase Act" the nominal phase deviation and the measured phase deviation are specified respectively. In "Phase Dev", by comparing "Phase act" and "Phase nom", the error in terms of minutes is calculated and the assessment is specified in "Assessment" field. In "Polarity" section, "Pol.Check" field assesses the validity of the polarity. And in the end, after the test is performed, it is necessary to add the results of the assessment to the report which is done by selecting "Add to Report".



Phase		Polarity	
Phase Nom:	0.00 °	Pol. Check	Ok
Phase Act:	0.19 °		
Phase Dev:	-11.0017 min		
Assessment	Passed		

Figure 4

If to perform the test in higher currents or to have more valid results, you wish to perform the test "Manually", you should set "Choose Measurement Mode" at "Manual" mode and according to the picture, use an ammeter. After checking "Manual", "I meas" is editable and you can manually change its number. By entering this value, the software calculates the error and displays it. Note that in "Manual" mode it is only possible to perform the turns ratio test. After selecting "Manual" mode, connect the connectors of the "CT" to the ammeter and set the test time at "5" seconds. Then press "Init Test" to perform the test. After the test is finished, enter the number read by the ammeter in "I meas" field so that the device can assess the test based on this value. In the end, after the test is finished, if you need to add the test results to the report, you can do that by selecting "Add to Report".



State Setting	
I Test:	100.0 A
State Time:	5.000 s
☒ at Calibration State	
Choose Current Measurement Mode:	
☒ Manual	☐ Automatic
☐ Don't change hardware settings	
Turns Ratio Result	
I calc.	200.0 mA
I actual	0.000 A
I meas.	0.000 A
Turns ratio nom	500
Turns ratio act	0.0000
Dev act	0.00 %
Assessment	Not Tested

Figure 5

Two notable points are that first, "Error Other" means that there is a problem in the connections or the route resistance is too high that the device is not able to provide the "Burden" need for current. Therefore, if you faced this error you should check the "Actual" value from "Signal View". If the current is injected ("Actual Current") but its difference with the specified current is too much, this means that the resistance is too high and if the "Actual Current" is zero, it means that the current injection route is open. If the route resistance is too high, the test current should be decreased or using several parallel routes and if the "Actual Current" is zero, the connections should be examined. The next point is that the current read by the device needs to have similar cycles. If the read values have too high tolerances or the tolerance is zero, it means that the connectors are not connected correctly.

[jg1]CT_ratio_and_polarity_test_with_current_method