



VEBKO ONLINE HELP

No Combined Characteristic

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1 Imported Content

According to the operation of differential relays, the differential of each phase is calculated separately, and based on the differential characteristic, the relay will either trip or not trip. In single-phase faults, you will notice that the differential and bias currents in the tested phase are twice those of the other two phases.

Signal	Magnitude	Harmonic 1	Phase	Real	Imaginary
I L1: I L1	1.500 A	0.000 A	180.00 °	-1.500 A	0.000 A
I L2: I L2	749.8 mA	0.000 A	0.00 °	749.8 mA	0.000 A
I L3: I L3	749.8 mA	0.000 A	0.00 °	749.8 mA	0.000 A
I L1(1): I L1(1)	481.1 mA	0.000 A	0.00 °	481.1 mA	0.000 A
I L2(1): I L2(1)	240.6 mA	0.000 A	180.00 °	-240.6 mA	0.000 A
I L3(1): I L3(1)	240.6 mA	0.000 A	180.00 °	-240.6 mA	0.000 A
(Ibias, Idiff)A_LN				2.000 In	1.000 In
(Ibias, Idiff)B_LN				1.000 In	0.500 In
(Ibias, Idiff)C_LN				1.000 In	0.500 In
(Ibias, Idiff)A_LL				2.000 In	1.000 In
(Ibias, Idiff)B_LL				1.000 In	0.500 In
(Ibias, Idiff)C_LL				1.000 In	0.500 In
IDiff	1.000 In				
IBias	2.000 In				

Figure 1

In such conditions, the relay essentially operates with two characteristics. The first

BIAS	DIFF	* 2 →	2* BIAS	2*DIFF
0.5 BIAS	0.5 DIFF		BIAS	DIFF

Figure 2

characteristic is the one set on the relay, and the second characteristic is obtained by

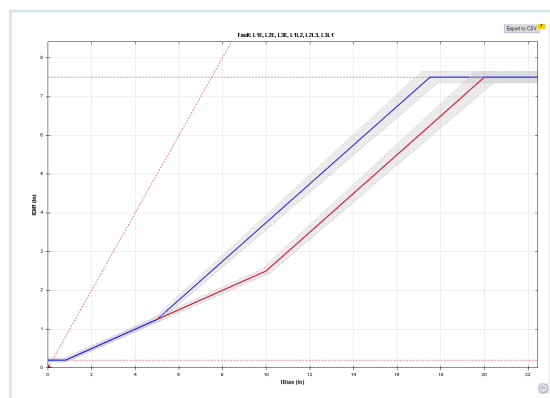


Figure 3

multiplying the Idiff and Ibias of the set characteristic by 2 (as shown in the table below).

BIAS	DIFF	$\times 2 \rightarrow$	2* BIAS	2*DIFF
0.5 BIAS	0.5 DIFF		BIAS	DIFF

Figure 4

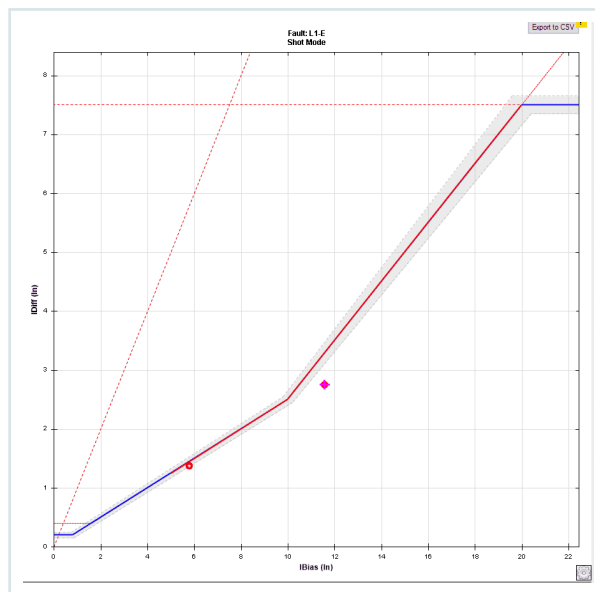


Figure 5

In differential characteristics with two slopes, by plotting the two mentioned characteristics, the resulting differential characteristics are obtained as shown:

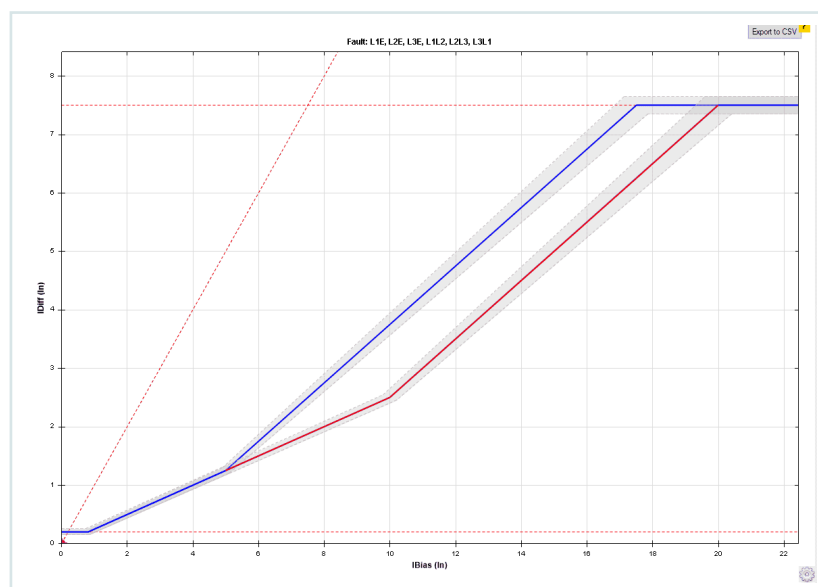


Figure 6

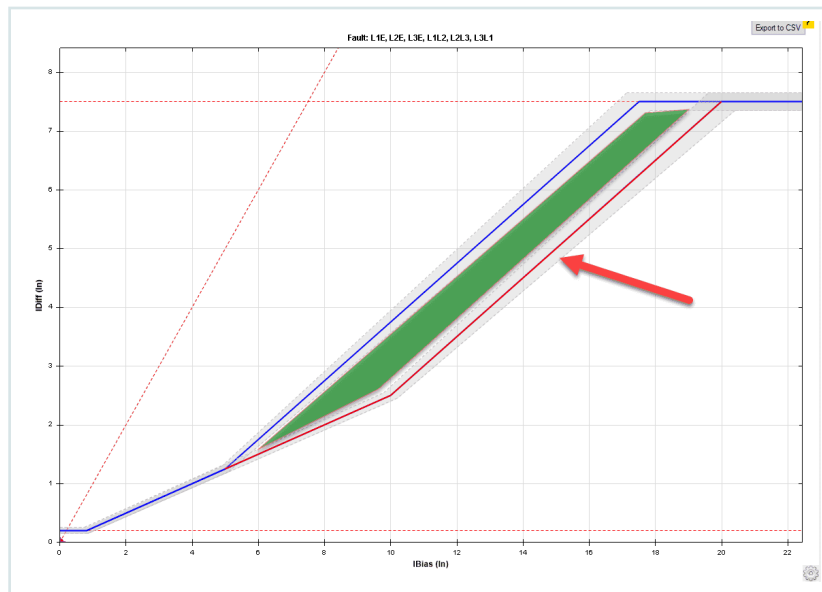


Figure 7

To derive the practical characteristic from these two characteristics, for each I_{bias} , you need to find the lowest I_{diff} value that causes the relay to operate, which typically refers

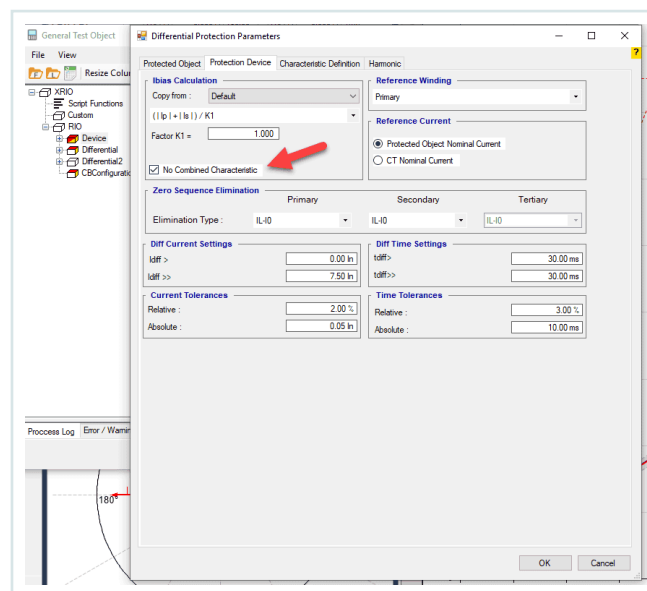


Figure 8

to lower differential currents and is obtained as shown:

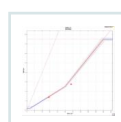


Figure 9

The following explanation can help clarify this concept:

In single-phase fault types, in a section of the characteristic (the green region shown in the figure below), the test point in question falls in the NO trip region. However, if you check the differential and bias currents of the other two phases, you'll see that they are in the TRIP region, and the relay will trip.

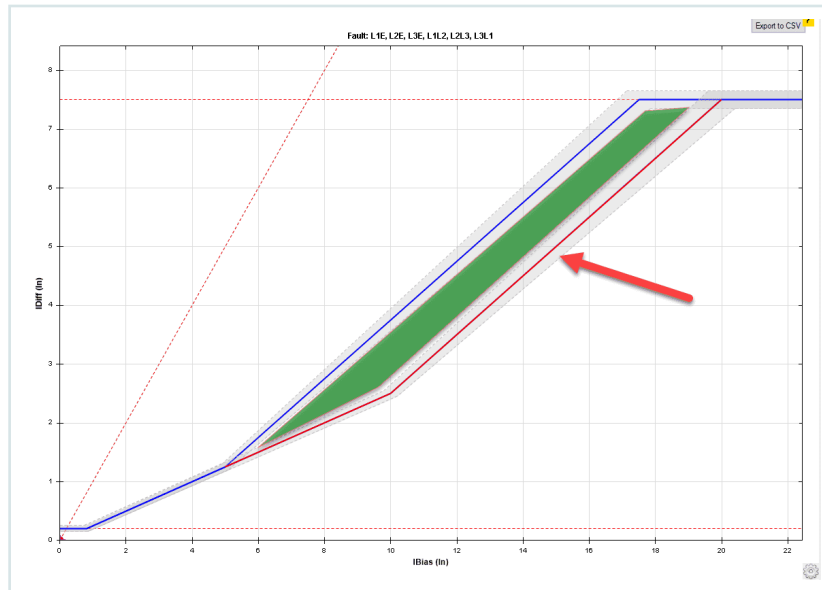


Figure 10

With the mentioned modifications, the differential characteristic is adjusted accordingly. That is, changes are made so that in this part of the characteristic, the selected point falls within the Tripping region.

For relays that can filter out high differential currents in healthy phases, such as the ABB RET670, to deactivate the use of combined characteristics, select the "No combined characteristic" option in the Protection Device tab.

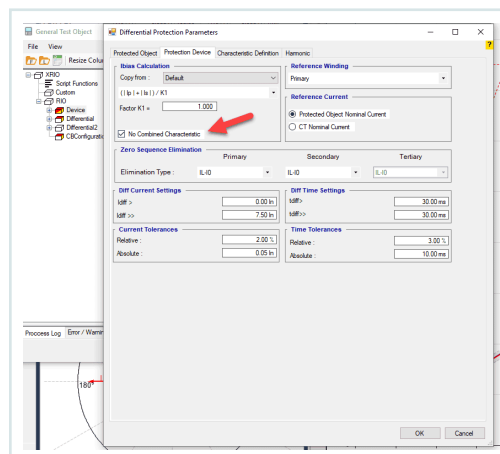


Figure 11

[jg1]NO_COMBINED_CHARACTERISTIC