



VEBKO ONLINE HELP

Introducing Over Current Room

Category	tester
Section	AMT Overcurrent Module
Language	English
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This room and other test relay rooms which were introduced by the name of “Medium” rooms before are used to test high current functions and “Over Load”. This room includes three windows of “Test View”, “Over Current Characteristic” and “Medium Detail View” which are used to enter the test points and display them in the intended characteristic curve.

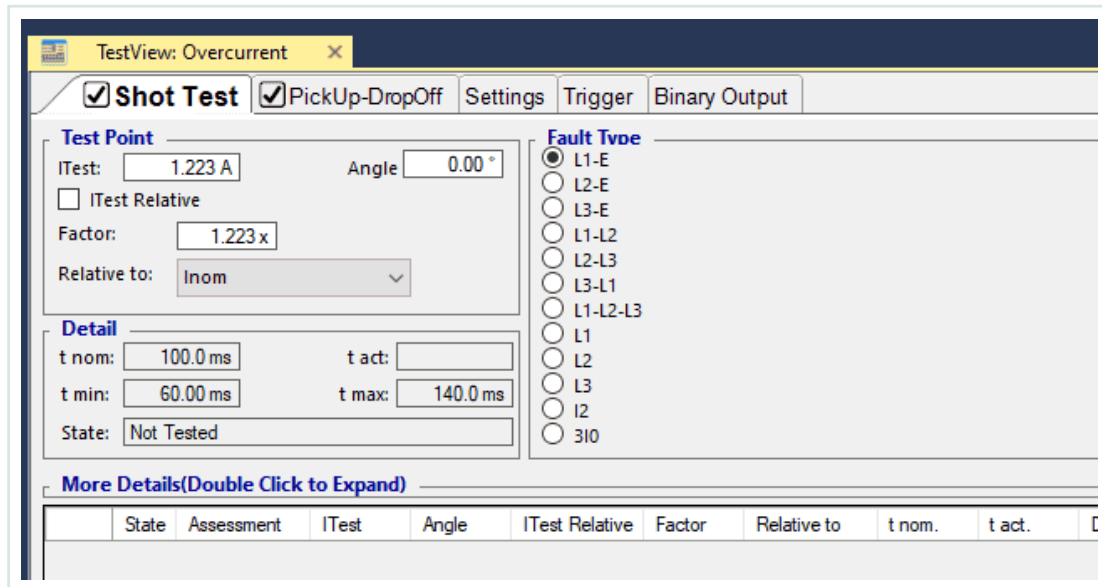


Figure 1

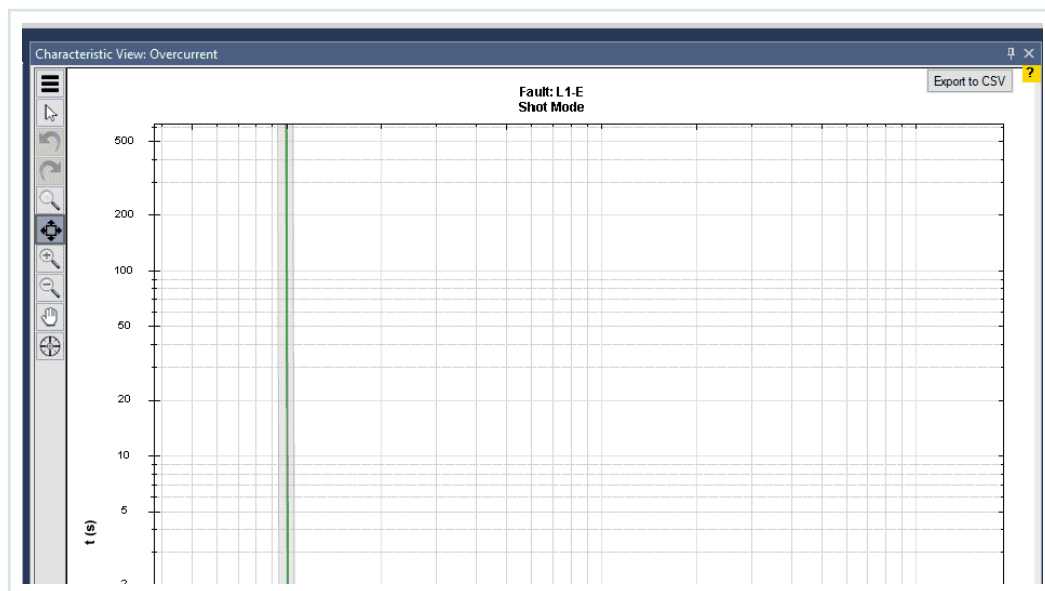


Figure 2

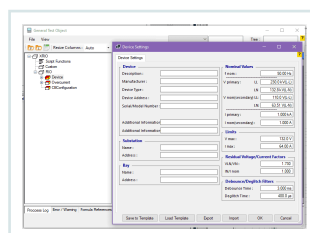


Figure 3

To test a relay, the first thing to do is to enter the relay information and settings in the software. To do this, first, select "Test Object" from the toolbar and from the tree diagram in "Device" section enter "I primary" and "I secondary" information which are the "CT" turn ratio. Note that any mismatch between the setting of this section and the relay will lead to wrong responses in relay test.

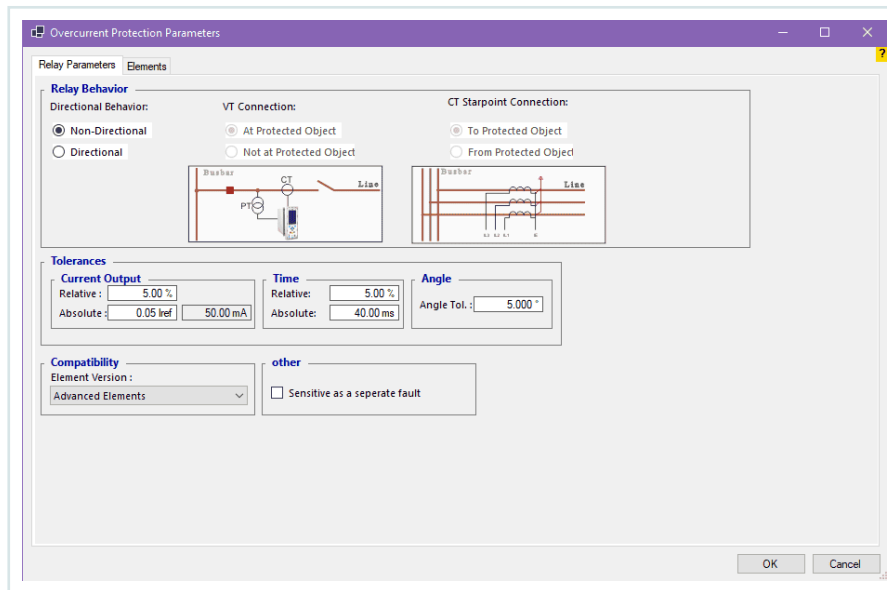


Figure 4

Next, you need to enter the relay setting from the tree diagram in "Over Current" block. By double-clicking on this block, "Overcurrent Protection Parameters" page opens which includes "Relay Parameters" and "Elements" tabs. In "Relay Parameters" tab, in "Relay Behavior" section, first you need to determine whether the relay is "Directional" or "Non-Directional". Then, in "Tolerance" section and "Current", "Time" and "Angle" sections, current and time tolerances and for "Directional" tests, angular tolerance are entered.

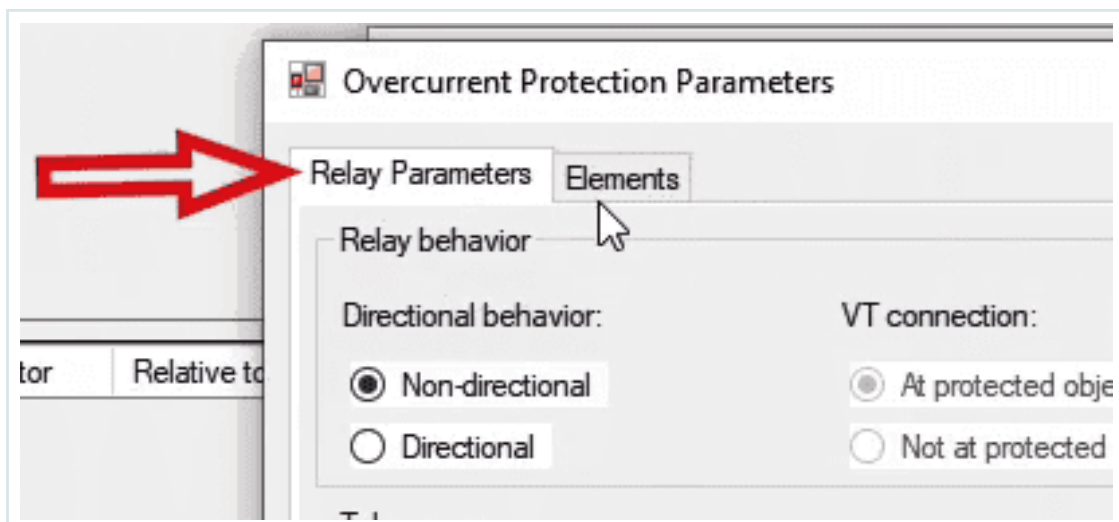


Figure 5

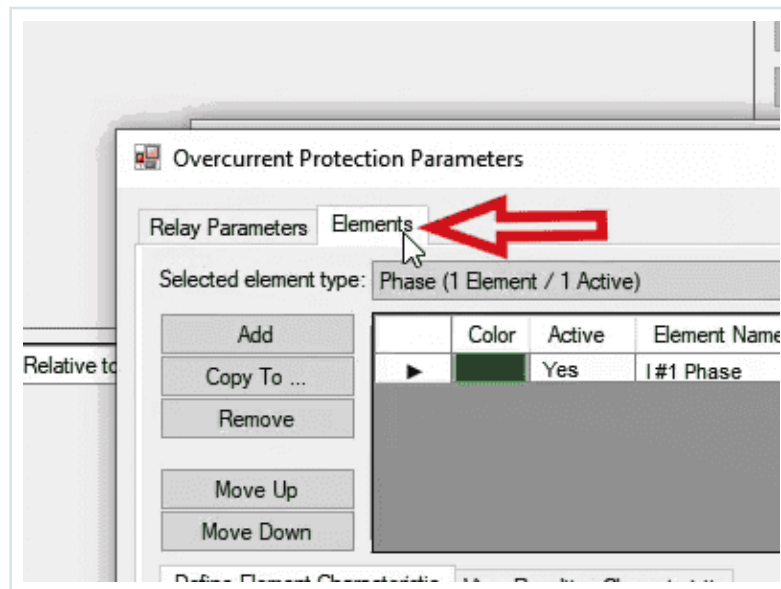


Figure 6

In "Elements" section, you need to determine the relay characteristic curve and its characteristics. To do so, first the type of intended current protection should be selected in "Selected Elements Type". Then, you need to specify the characteristic curve information in the table in this page and create the relay "Curve".

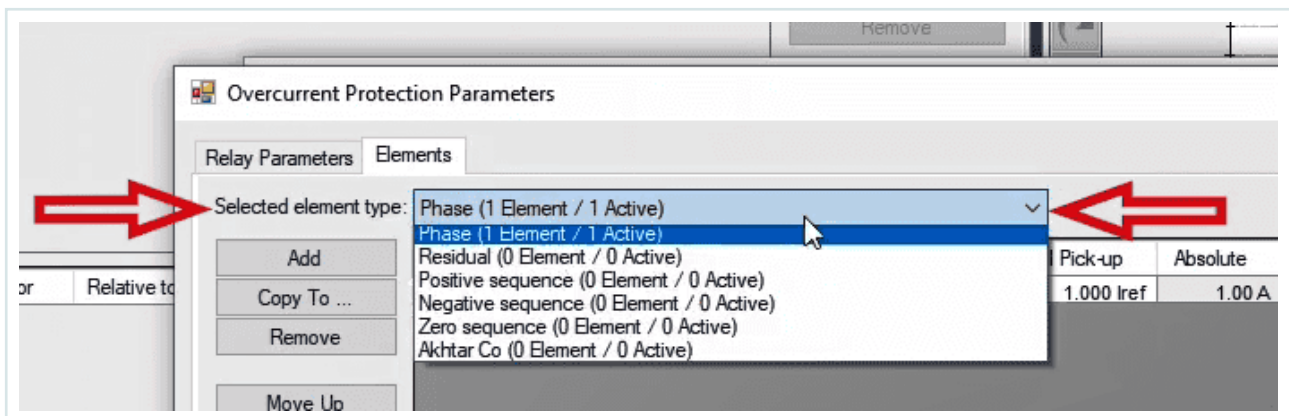


Figure 7

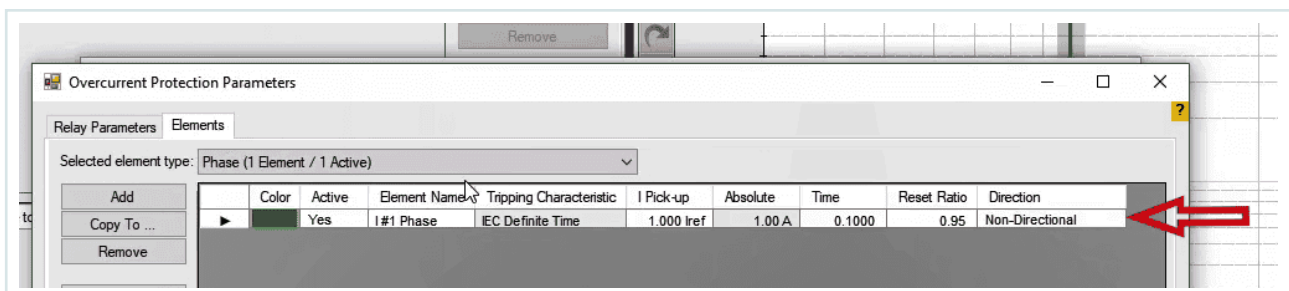


Figure 8

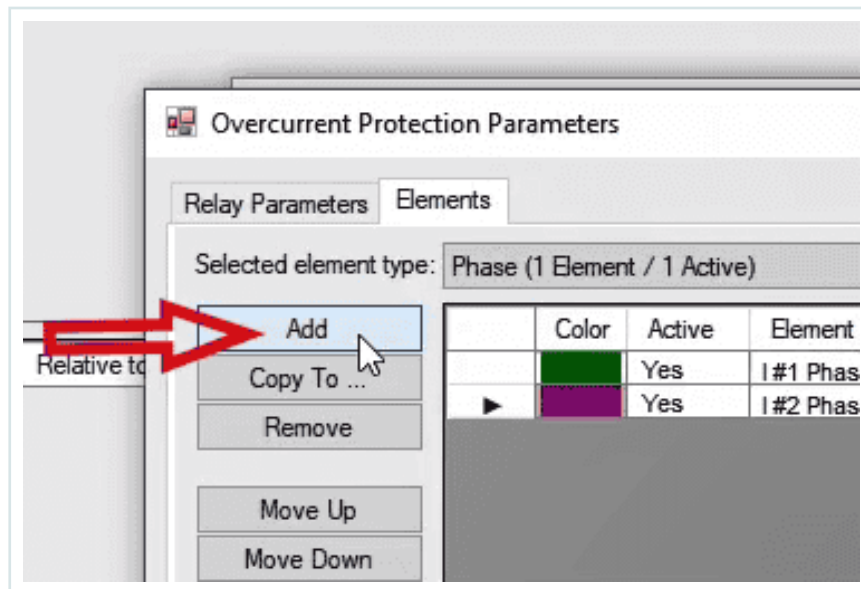


Figure 9

By using "Add", you can add more rows to the table and if there are multiple "Stages", create another "Curve". Also, "Copy to" and "Remove" options are used to use the curve created in different protections and remove the created row respectively. "Move Up" and "Move Down" options are used to move a "stage" up or down respectively.

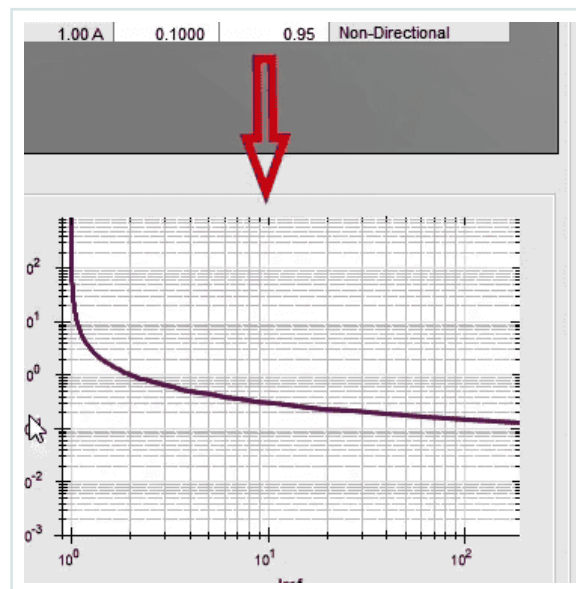


Figure 10

In "Define Element Characteristic" tab and in "Characteristic" section, the type of characteristic curve and in "Range Limits" section, current and time ranges which are protected by the intended "Stage" should be specified. Also, if a characteristic curve is specified for "Dropping" the relay, you can enter

its setting in “Reset Characteristic” section. The “Curve” of every “Stage” is displayed separately in the diagram at the right side. In “View Resulting Characteristic” section, you can view the characteristic curve resulted from specified “Stages”.

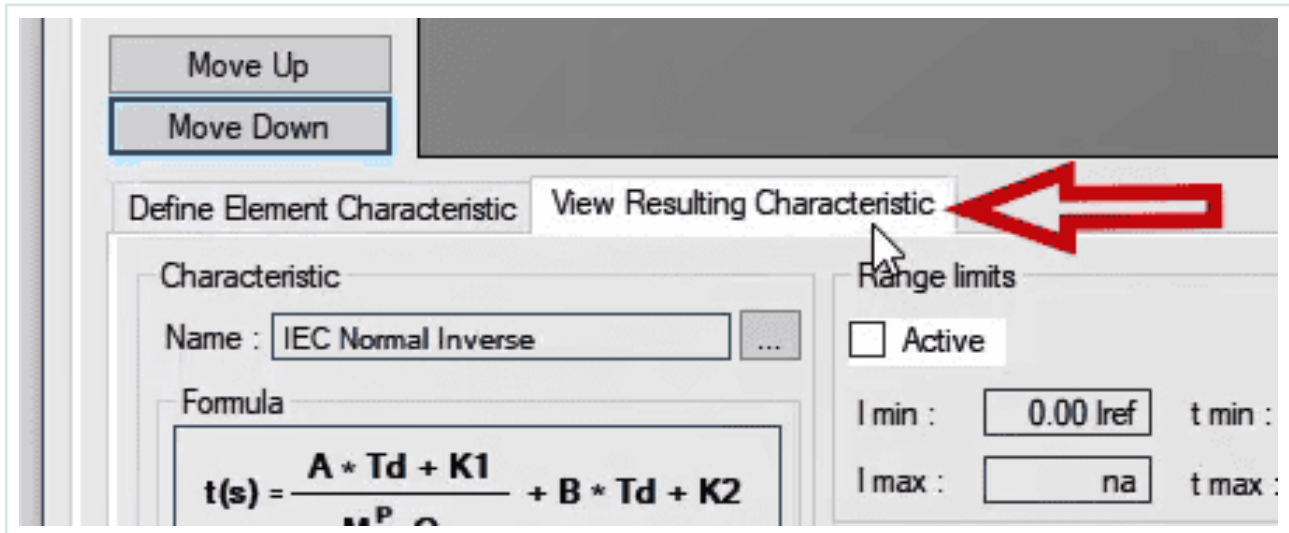


Figure 11

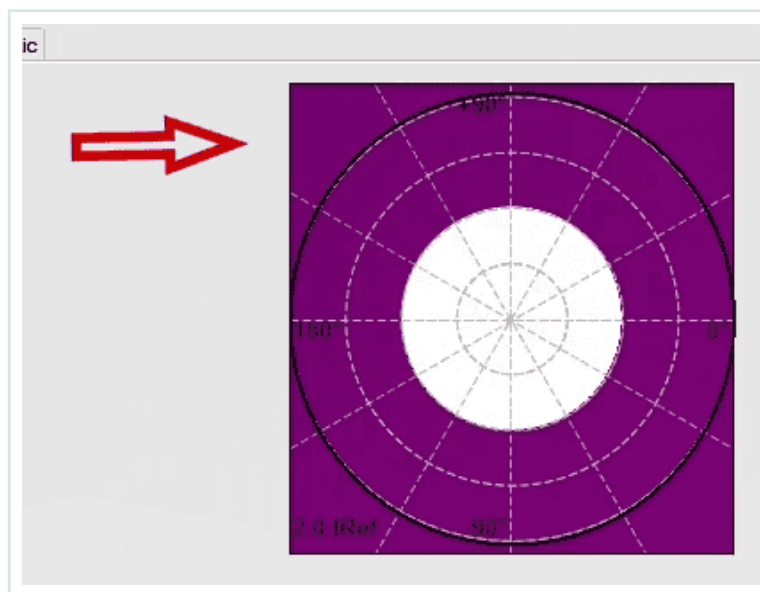


Figure 12

If in “Relay Behavior” page, the relay is specified as a “Directional” one, another tab named “Define Element Directional Behavior” is added where the setting related to the unit protected by the relay is entered. Moreover, a polar diagram is added in which the angle protected by the relay is specified schematically.

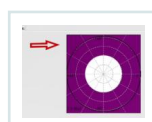


Figure 13

After entering the relay characteristic and confirming the changes, it is possible to specify some points on the characteristic curve and run the test in “Test View” and “Over Current Characteristic”. In future videos, each of the mentioned sections will be explained in greater detail.

By selecting any of the “Element Versions” in the “Compatibility” section, the pickup current coefficients change for each element. By selecting “Advanced Element”, the coefficients for the specified characteristics is change into what can be seen in the picture. This means that the pickup current determined for that characteristic is multiplied by the displayed coefficient and “Fault Type” is applied for it. As an example, if you determine an element in negative sequence and you wish to test this element in “L1L2” mode, this characteristic can be tested by multiplying square root of 3 in pickup current. These coefficients are extracted from negative, positive and zero sequence matrix. One example is provided about how to calculate these coefficients and other coefficients can be achieved by following the same procedure.

$$\begin{aligned}
 I_0 &= \frac{1}{3}(I_a + I_b + I_c) \\
 I_0 &= \frac{1}{3}(I_a + \alpha I_b + \alpha^2 I_c) \\
 I_0 &= \frac{1}{3}(I_a + \alpha^2 I_b + \alpha I_c) \\
 \text{Fault "L1L2"} &\Rightarrow I_{\text{Fault}} \begin{cases} I_{L1} = I_a \angle 0 \\ I_{L2} = I_a \angle 180 \\ I_{L3} = 0 \end{cases} \\
 I_0 &= \frac{1}{3}(I_a \angle 0 + I_a \angle 180) = 0 \\
 I_1 &= \frac{1}{3}(I_a \angle 0 + (e^{i\frac{2\pi}{3}} I_a \angle 180)) \Rightarrow I_1 = \frac{I_a}{3}(1 + (1 \angle 120 * 1 \angle 180)) \Rightarrow I_1 = \frac{I_a}{3}(\sqrt{3} \angle -30) \Rightarrow I_a = \sqrt{3} I_1 \angle 30 \\
 I_2 &= \frac{1}{3}(I_a \angle 0 + (e^{-i\frac{2\pi}{3}} I_a \angle 180)) \Rightarrow I_2 = \frac{I_a}{3}(1 + (1 \angle -120 * 1 \angle 180)) \Rightarrow I_2 = \frac{I_a}{3}(\sqrt{3} \angle 30) \Rightarrow I_a = \sqrt{3} I_2 \angle -30
 \end{aligned}$$

Figure 14

But in “Simple Fault Loop” which is an algorithm used by older relays, these coefficients are, as you can see, different. To facilitate analyzing the effects of coefficients on characteristics, there is a section named “More Details” on “Test View” page by double-clicking on which another section opens where the information regarding the characteristics along with their coefficients are displayed. The difference between “Advanced Element” and “Zero-Sensitive Elements” is in the “3I0” characteristic coefficient; one of these two should be selected in accordance with the relay algorithm.

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