



VEBKO ONLINE HELP

Writing Formula for “XRIO Converter”4

Category	tester
Section	Modules Toolbar and Statusbar
Language	English
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After completing the information regarding "Relay Parameter Section" and "Additional Information" sections, it is necessary to-you should- complete information of the "Rio" section as well. In "Rio" section, by double-clicking on any block, a window, which includes information about parameters of that block, opens; this information is also available in the tree diagram of that block. For example, parameters like "Device Name", "Manufacturer", etc. are located in "Name Plate" block. It is possible to assign a value to these parameters directly or associate them with parameters from "Custom" section by using formulas. In this video, necessary parameters for an overcurrent function are linked to values from the "Custom" section. Note that in writing a formula, the "ID" of each parameter is used.

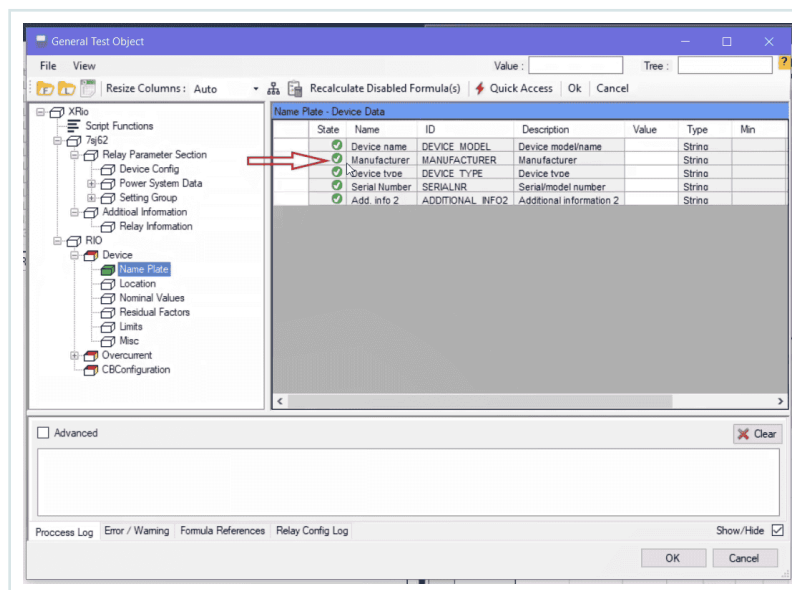


Figure 1

Linking parameters of "Rio" section: In this video –the target- our goal is to complete the information regarding the "51" function. "In", "I prim", etc. parameters are located at the "Nominal Values" section. To link values of the "In" parameter with the values of "XRio", it is necessary to define a formula for this parameter. To do so, after double-clicking on "State" column, in "Rio Parameter Viewer" window from "Value Properties" section, click on "..." icon in the "Formula" field to open "XRio Formula Editor" window. On this window, first the intended parameter (CT Secondary) should be entered. To do this, click on "+" and in "Add Ref.Param" window, select "CT Secondary" parameter from the "XRio" tree diagram. Then, select "Enumeration=1A" and "ID=TX1_1_201" from the box at the bottom of the page to add them to the "References" section. -For The "In" parameter when the "CT Secondary" parameter's "Enumeration=1A", the value of the parameter "In=1A"; otherwise, it should be "5A". To write this formula, the "If" command is used in a way that the final formula is "If(CT_SEC=TX1_1_201,1,5)". Then, click on "Test" to validate the formula. In the "Result" section, "Result Value=1A". Finally, click on "OK" to save the settings.



Figure 2

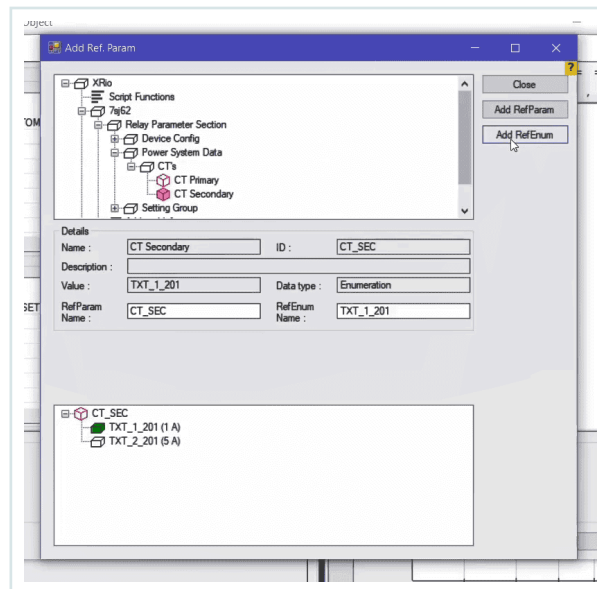


Figure 3

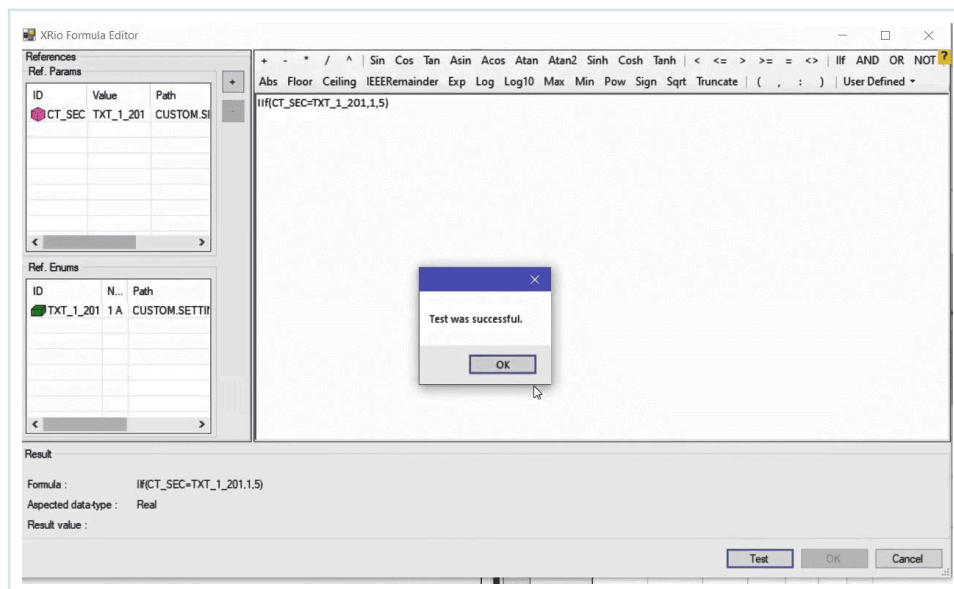


Figure 4

You can see that the color of "Value" cell of "In" parameter is turned into purple which means that its value is associated with another parameter based on the formula in the "Formula" column. Also, by clicking on "Reference map", you can see that the value of this parameter is linked to another parameter. By double-clicking on the box of the parameter, the given address for this parameter (CT Secondary) is displayed. If the value of this parameter is changed to "5A", the value of "In" parameter changes accordingly. The value of "I prim" parameter is linked to the value of "CT Primary" parameter in the same way. By following the mentioned steps, "CT Primary" parameter is added to the "References" section. Because this parameter is of the "Real" type and lacks "Enumeration", to write

the formula, only the phrase "CT_PRIMARY" is entered. The written formula means that the "I prim" parameter will have the same value as the "CT Primary" parameter.

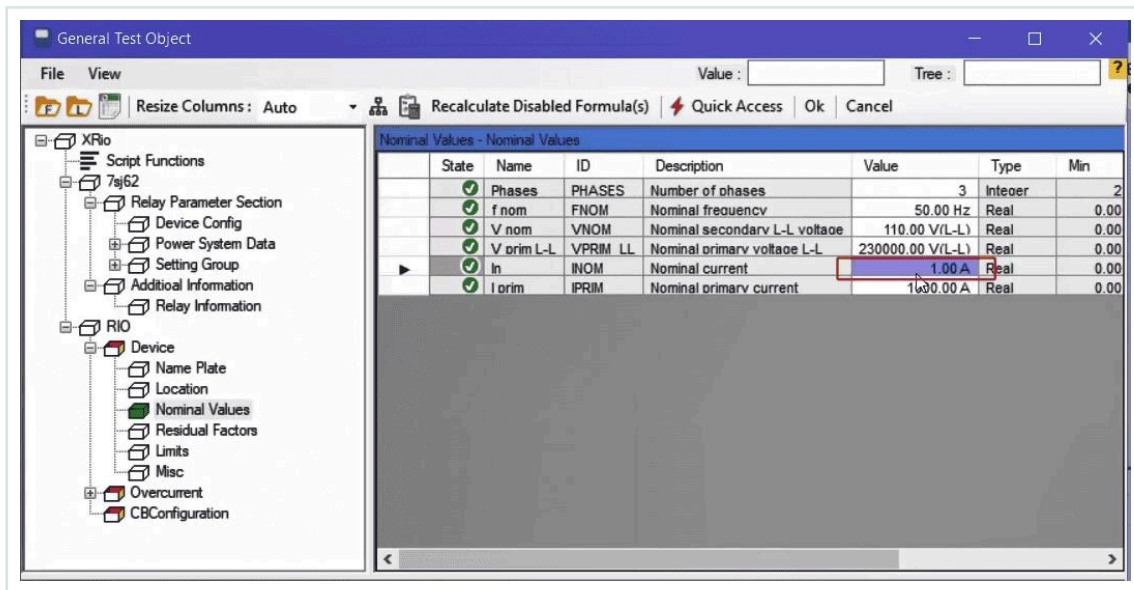


Figure 5

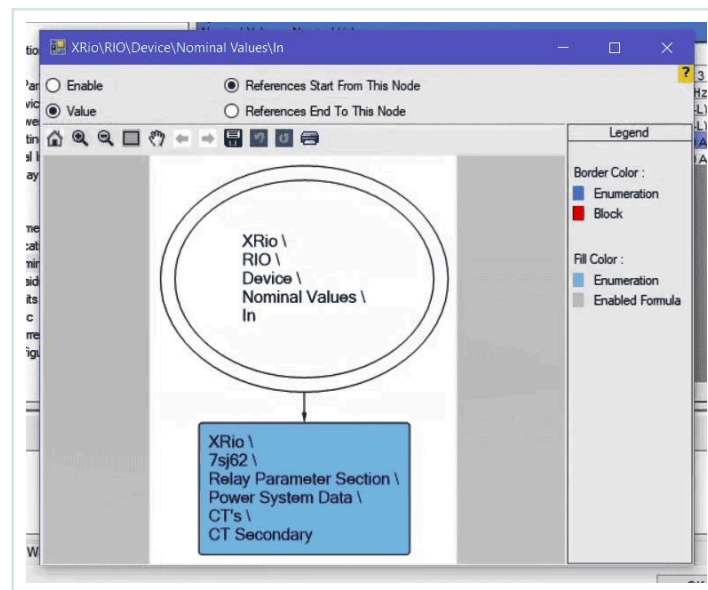


Figure 6

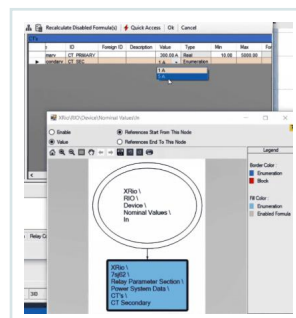


Figure 7

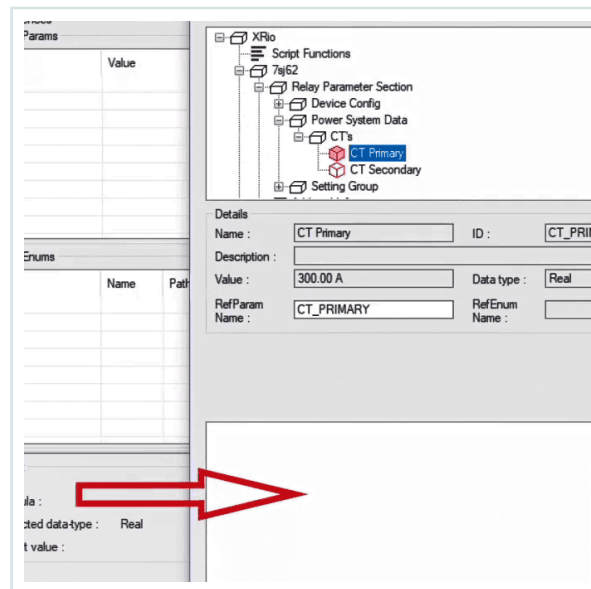


Figure 8

"Overcurrent" block: After completing "Device" block, information of the "Overcurrent" block should be completed. By double-clicking on this block, you can see that there is a series of parameters in "Relay Parameters" and "Elements" tabs which are also available from the "Overcurrent" tree diagram separately. Also, in the "General" block, parameters such as "Time Tolerance Relative", "Time Tolerance Absolute", "Current Tolerance Relative" and "Current Tolerance Minimum" are available. The information regarding these parameters is available from "Relay Information" block in "Custom" section. These parameters should be used in the "Rio" section as well. It should be noted that the value of "Reference Current" parameter is, by default, linked to the value of "INOM" parameter in the "Nominal Values" block. Double-click on the "State" column in "Time Tolerance Relative" parameter and on "Rio Parameter Viewer" window, click on "..." option. On the "XRIO Formula Editor" window in the "References" section, after clicking on "+", "t-Tolerance rel" parameter is added to the "References" section from the "XRIO" tree diagram. Then, the formula is written in form of "TTOLREL". Next, click on "TEST" and after "Test was successful" message is displayed, click on "OK". A "5%" value is displayed in the "Result Value" section. Likewise, the value of "Time Tolerance Absolute" and "Current Tolerance Relative" parameters are linked to and associated with the values of "t-Tolerance abs" and "I-Tolerance rel" parameters. In the manual of the relay, "Current Tolerance Minimum" parameter is stated as that there is at least "10mA" and "50mA" current error in "1A" and "5A" nominal currents respectively. To state this parameter in the software, the formula should be written as "0.01*Inom". First, it should be determined whether the nominal current is "1A" or "5A". Because the "Current Tolerance Minimum" parameter is stated in accordance with "IREF", to write the formula, "CT Secondary" and "Reference Current" parameters and "Enumeration=1A" with "ID=TX1_1_201" are should be selected and added to "References" section. Finally, the formula is written as "0.01*if(CT_SEC=TX1_1_201,1,5)/IREF".



Figure 9

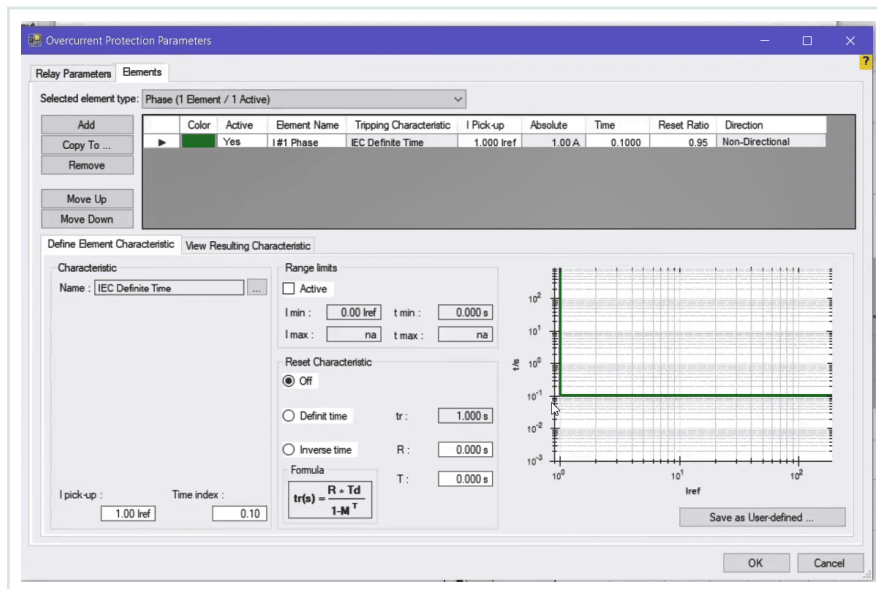


Figure 10

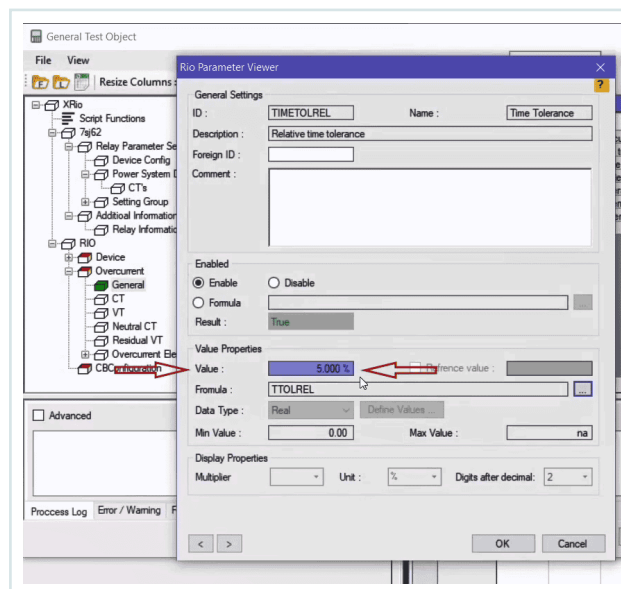
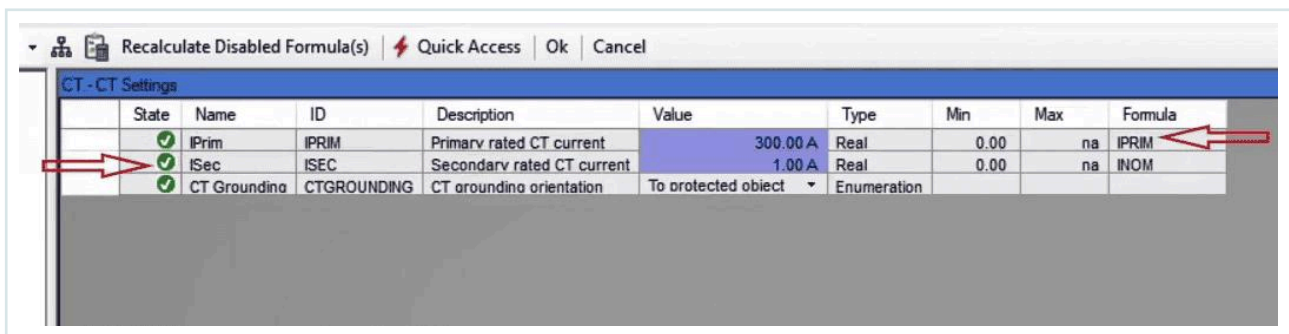


Figure 11

General - General relay properties						
	State	Name	ID	Description	Value	Type
	✓	Is Directional	ISDIRECTIONAL	Directional overcurrent relay(needs voltages)	No	Boolean
	✓	Current Tolerance Minimum	CURRENTTOLABS	Minimum current tolerance	0.05 Iref	Real
	✓	Current Tolerance Relative	CURRENTTOLREL	Current tolerance as percentage of test current	2.00 %	Real
	✓	Time Tolerance Absolute	TIMETOLABS	Absolute time tolerance	0.03 s	Real
	✓	Time Tolerance Relative	TIMETOLREL	Relative time tolerance	5.00 %	Real
	✓	Reference Current	IREF	Reference current(refer e.o. to Inom or a CT Isec)	1.00 A	Real
	✓	Compatibility	COMPATIBILITY	Can be used to emulate Overcurrent 2.30 behaviour(i.e. do not combine elements)	TU 2.40 Elements	Enumeration
	✓	Anole Tolerance	TOLANGLE	Anole tolerance	5.00 °	Real

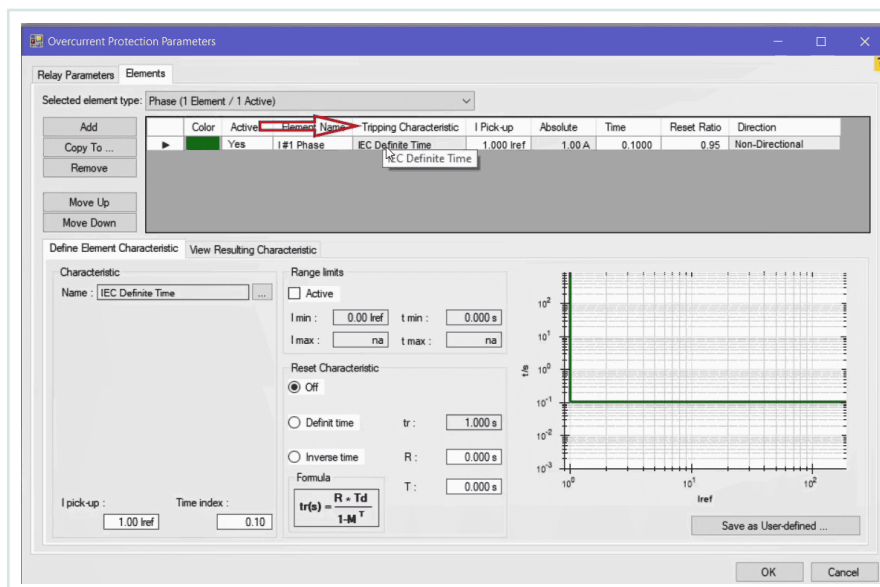
Figure 12

Note that in the "CT" block, the values of "IPrim" and "ISec" parameters are, by default, linked to the values of "IPRIM" and "INOM" parameters in "Nominal Values" section. Moreover, the parameters of "VT", "Neutral CT" and "Residual VT" blocks are, by default, linked to the values of "XRIO Converter". The "Timed Overcurrent Element" subcategory in the "Overcurrent Elements" block gives us information about "50/51" function like "Pickup" current and operation time. As mentioned before, in this video, our goal is to complete the information of "51" function. To activate "51" block, double-click on "OverCurrent" block. Then, in the "Element" tab double click on "Tripping Characteristic" column and select "IEC Normal Inverse" curve from the "Manage / Select characteristic" window and then click on "OK". Then, in the "Operating Curves" block, you can see that the "51" curve is defined as an "IEC Normal Inverse" and the information about this curve is displayed as well.



State	Name	ID	Description	Value	Type	Min	Max	Formula
✓	IPrim	IPRIM	Primary rated CT current	300.00 A	Real	0.00	na	IPRIM
✓	ISec	ISEC	Secondary rated CT current	1.00 A	Real	0.00	na	INOM
✓	CT Grounding	CTGROUNDING	CT grounding orientation	To protected object	Enumeration			

Figure 13



Overcurrent Protection Parameters

Relay Parameters Elements

Selected element type: Phase (1 Element / 1 Active)

Color	Active	Element Name	Tripping Characteristic	I Pick-up	Absolute	Time	Reset Ratio	Direction
Green	Yes	IEC Define Time	IEC Define Time	1.000 Iref	1.00 A	0.1000	0.95	Non-Directional

Define Element Characteristic View Resulting Characteristic

Characteristic Name: IEC Define Time

Range limits

☐ Active

I min: 0.00 Iref t min: 0.000 s

I max: na t max: na

Reset Characteristic

☒ Off

☐ Definit time tr: 1.000 s

☐ Inverse time R: 0.000 s

T: 0.000 s

Formula

$$tr(s) = \frac{R + Td}{I - M^T}$$

I pick-up: 1.00 Iref Time index: 0.10

Save as User-defined ...

OK Cancel

Figure 14



Figure 15

[jg1]Writing_formula_for_XRio_Converter4