

Test Tutorial

Equipment Type: Protection Relay

Brand: Schneider (Areva)

Model: P632

Function: 50 or PIOC- Instantaneous Overcurrent and 51 or PTOC – Time Overcurrent

Tool Used: CE-6003, CE- 6006, CE-6707, CE-6710, CE-7012
our CE-7024

Objective: Timed pickup/dropout test of the units of Phase (51),
timed curve survey, instantaneous pickup test of phase units (50).

Version control:

Version	Descriptions	Date	Author	Reviewer
1.0	Initial Version	08/09/2021	M.R.C.	M.P.S

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INSTRUMENTOS PARA TESTES ELÉTRICOS

Statement of responsibility

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Suggestions for improvement of this material are welcome, just user contacting us via email suporte@conprove.com.br.

The tutorial contains knowledge gained from the resources and technical data at the time was writing. Therefore, CONPROVE reserves the right to make changes to this document without prior notice.

This document is intended as a guide only; the manual of the equipment under tested should always be consulted.



ATTENTION!

The equipment generates high current and voltage values during its operation. Improper use of the equipment can result in material and physical damage.

Only suitably qualified people should handle the instrument. It should be noted that the user must have satisfactory training in maintenance procedures, a good knowledge of the equipment to be tested and also be aware of safety standards and regulations.

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Sequence for testing the P632 relay in the Overcurrent software

1. Relay connection to CE-6006

Appendix A-1 shows the relay terminal designations.

1.1 Auxiliary Source

Connect the positive (red terminal) of the Vdc Aux. Source to pin 7 on relay terminal (module X093) and the negative (black terminal) of Vdc Aux. Source to pin 8 of relay terminal (module X093).

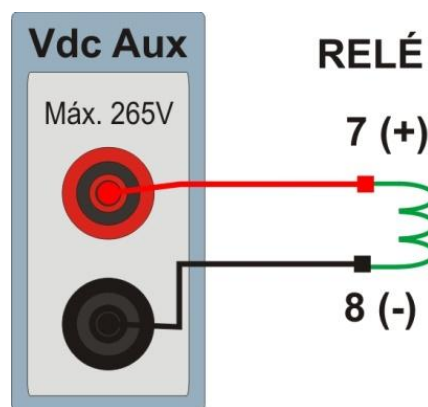


Figure 1

1.2 Current Coils

To establish the connection of the current coils, connect channels I1, I2 and I3 to pins 1, 3 and 5 of the relay terminal (module X032) and those common to pins 2, 4 and 6 (module X032).

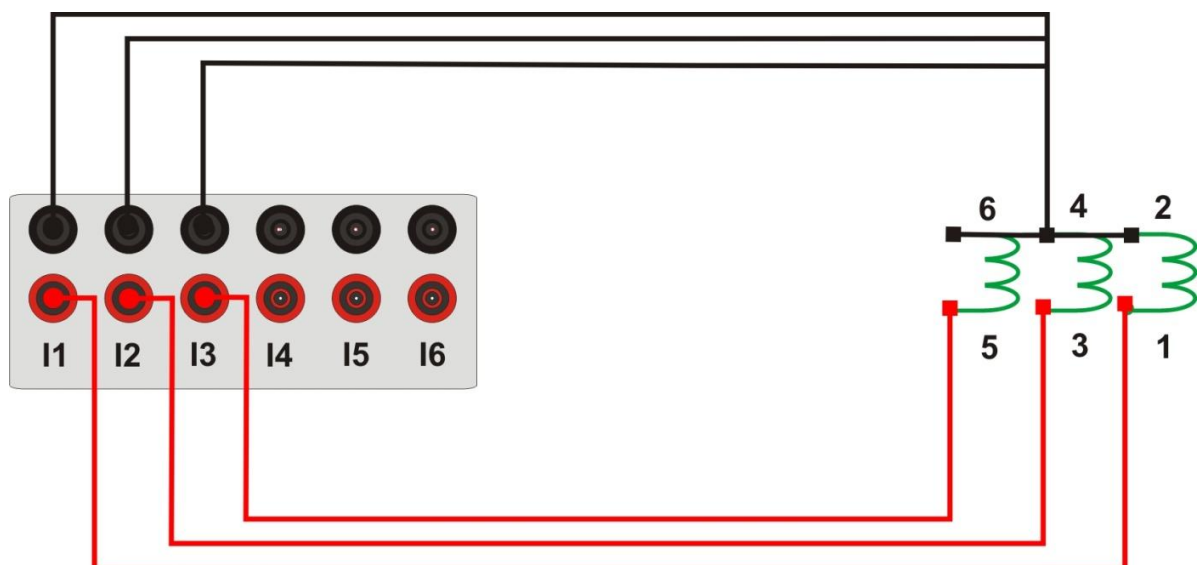


Figure 2

1.3 Binary Inputs

Connect the CE-6006 binary inputs to the relay binary outputs.

- BI1 to pin 2 and its common to pin 1 of relay module X092.
- BI2 to pin 3 and its common to pin 1 of relay module X092.
- BI3 to pin 4 and its common to pin 1 of relay module X092.
- BI4 to pin 5 and its common to pin 1 of relay module X092.

The following figure shows the details of the connections.

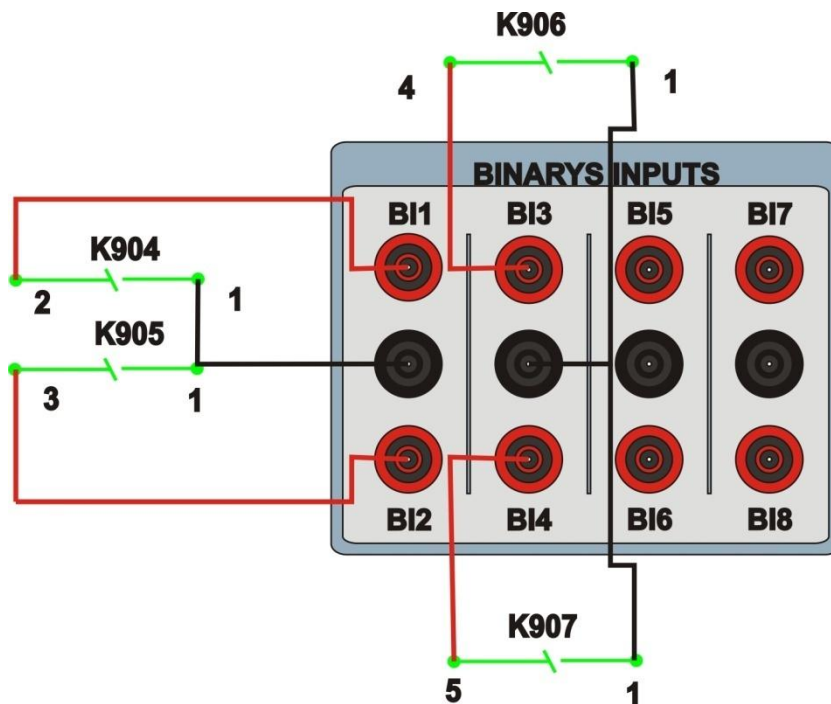


Figure 3

2. Communication with P632 relay

First, open the *MICOM S1 Studio* and connect a serial cable from the notebook to the relay. Then double click on the software icon.



Figure 4

Then make the connection with the relay. The next step is to extra go all the information set in the relay. Right-click on “*Settings*” and “*Extract Settings*”.

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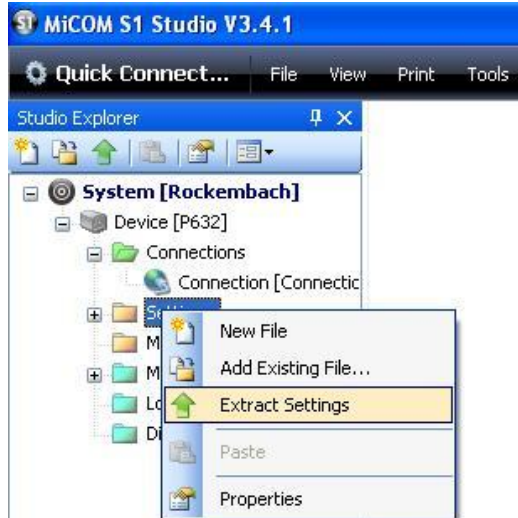


Figure 5

The reading of the settings will appear with the name of “000” and can be modified if necessary. In this case the file name was changed to “Sobrecorrente”.

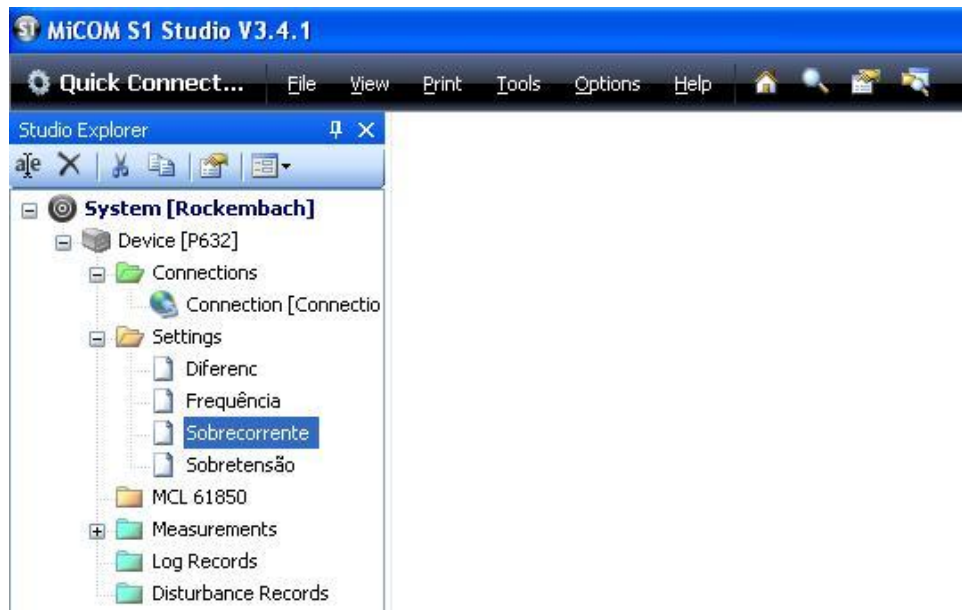


Figure 6

3. Parameterization of the P632 relay

3.1 Function group DTOC1

After double-clicking on the file, go to “Parameters > Config. Parameters > DTOC1”. Within this folder, the “Function group DTOC1” function is enabled. This setting allows the user to work with defined times for the overcurrent function.

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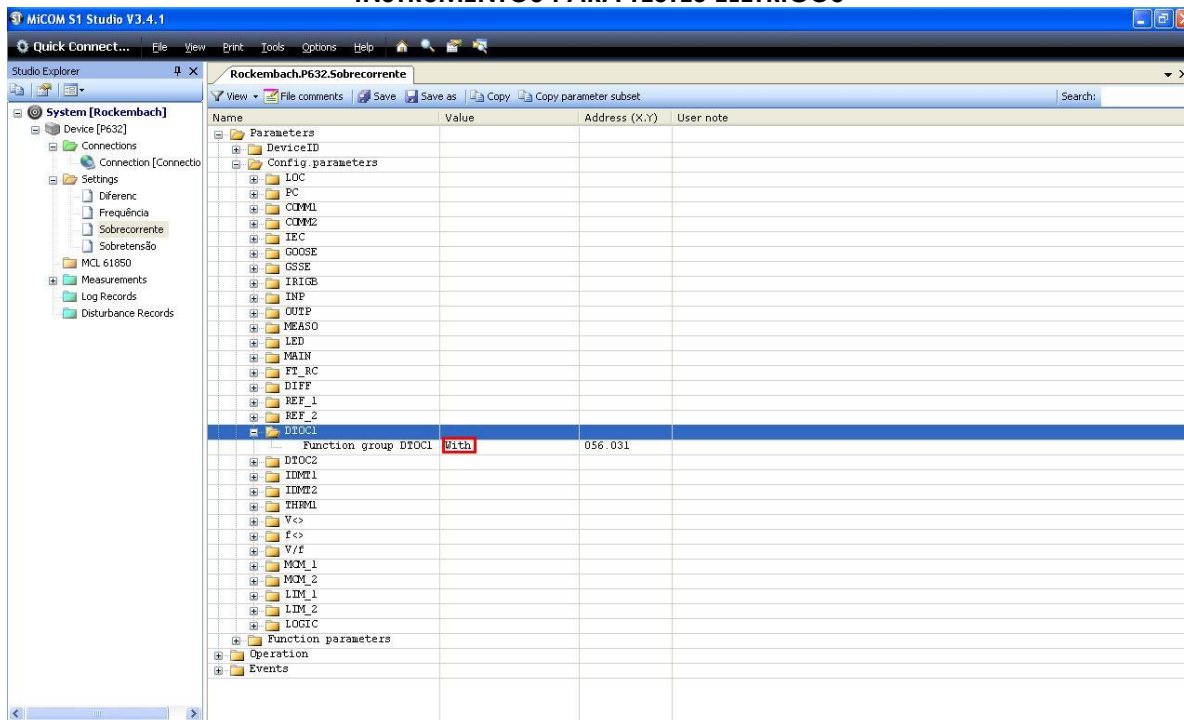


Figure 7

3.2 Function group IDMT1

Within the “IDMT1” folder, the “Function group IDMT1” function is enabled. This setting allows the user to work with an inverse overcurrent curve.

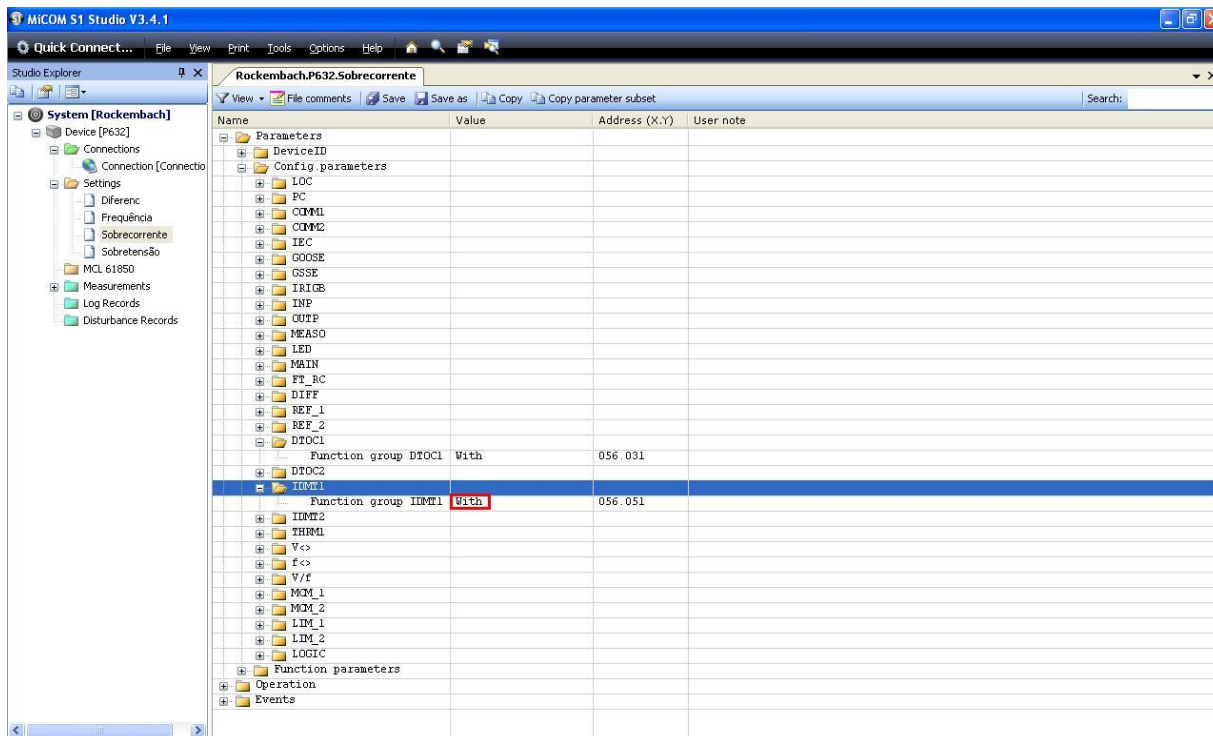


Figure 8

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3.3 Main

Click on the “+” sign under “*Functional parameters > Main*”. This screen adjusts the nominal frequency, the phase sequence, primary currents and voltages, and the secondary currents and voltages.

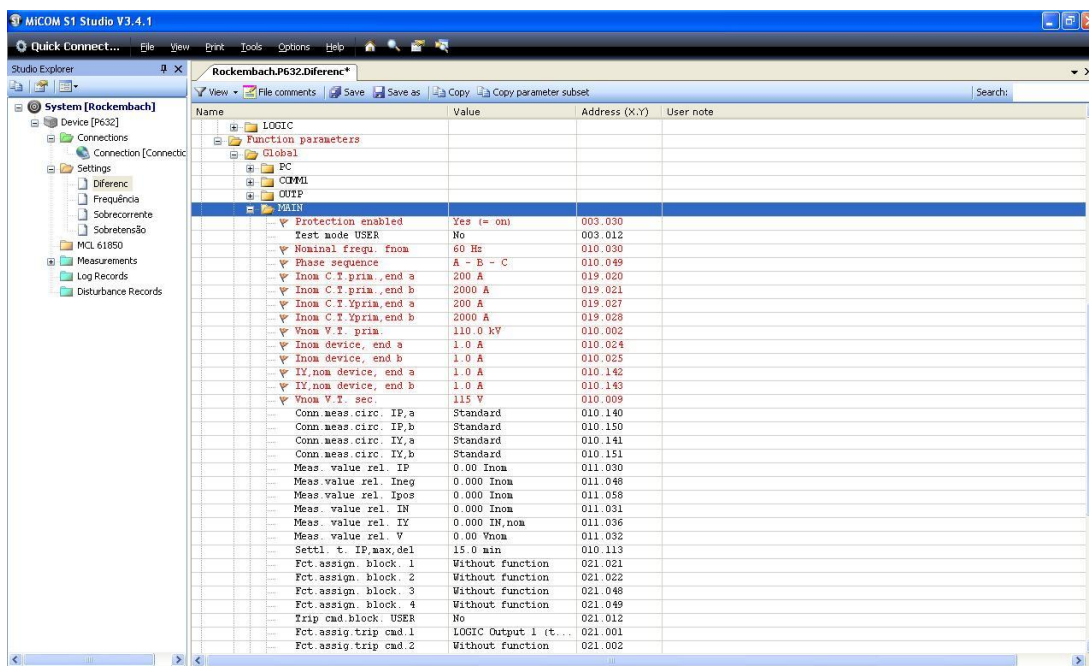


Figure 9

3.4 PPS

Make sure that group one is active, click on the “PPS” option and make the following adjustment:

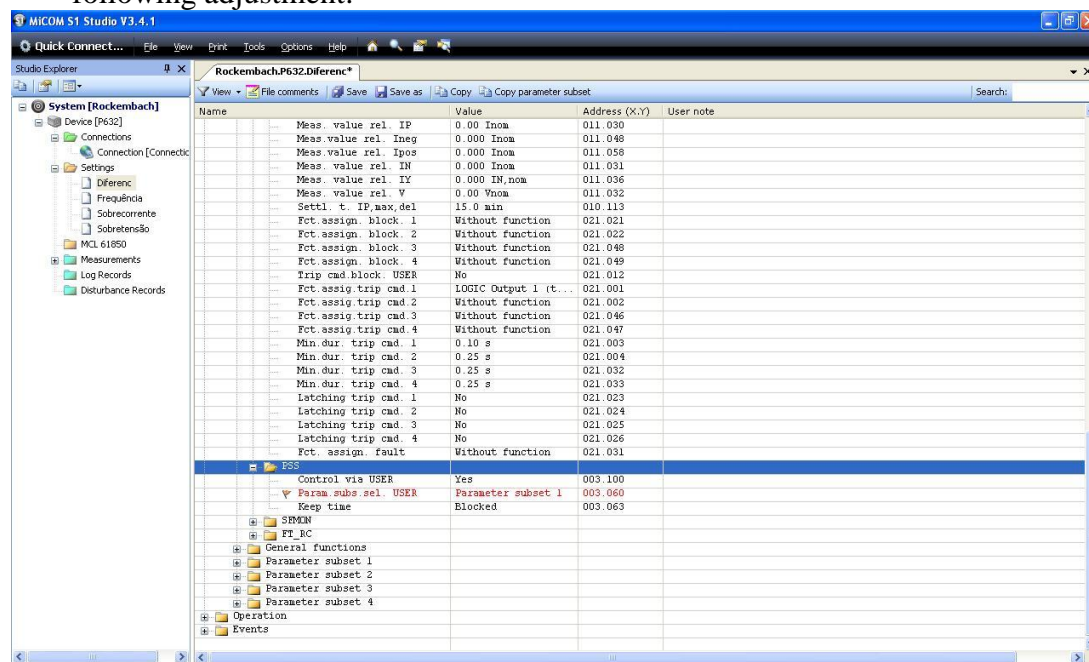


Figure 10

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3.5 Main

Click on the “+” sign under “*General functions > Main*”. In this option, the nominal voltages on each side of the transformer are adjusted.

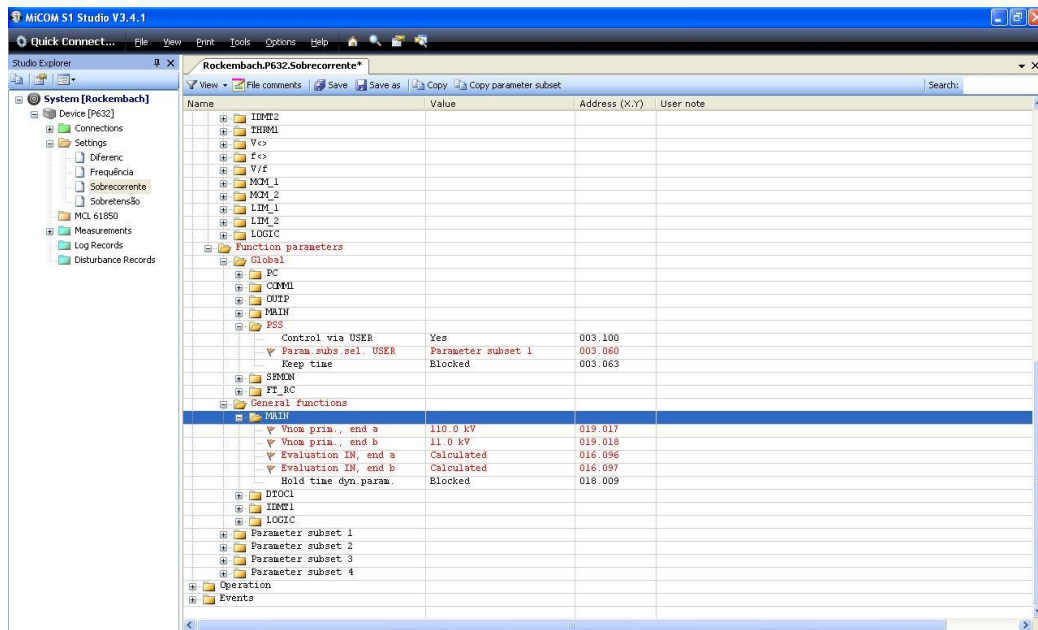


Figure 11

3.6 DTOC1 and IDMT

In this field, functions 50 and 51 are activated and the winding that will be protected is chosen.

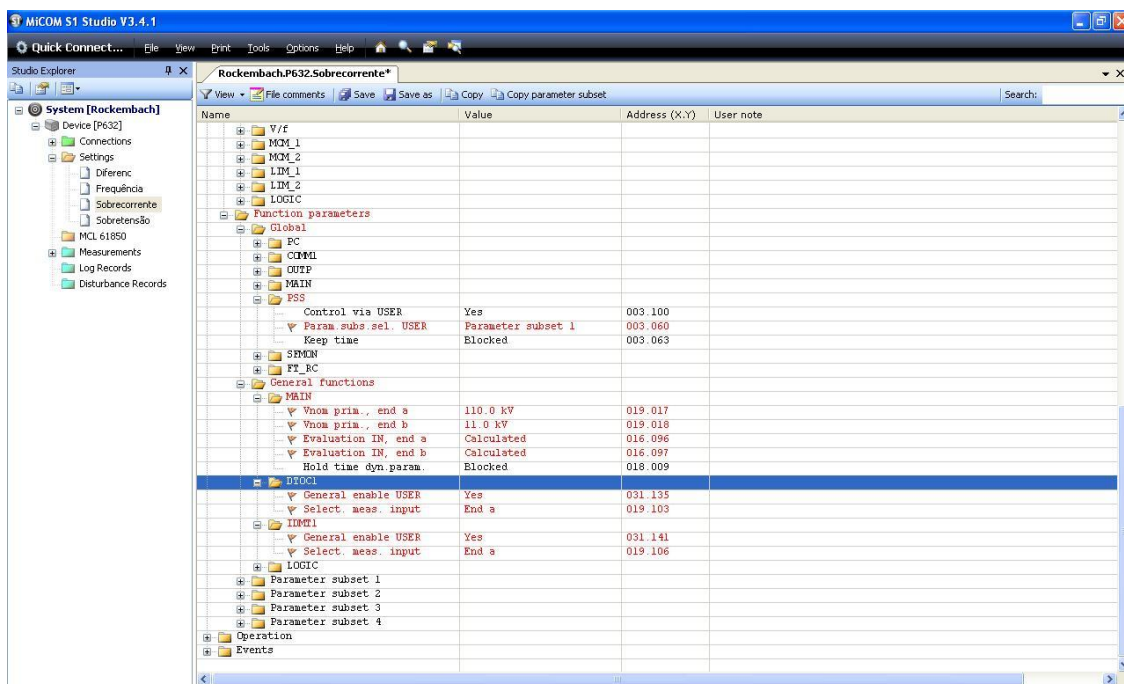


Figure 12

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3.7 Main

Click on the “+” sign near to “*Parameter subset 1*” and then on “*Main*” to adjust the CT connections.

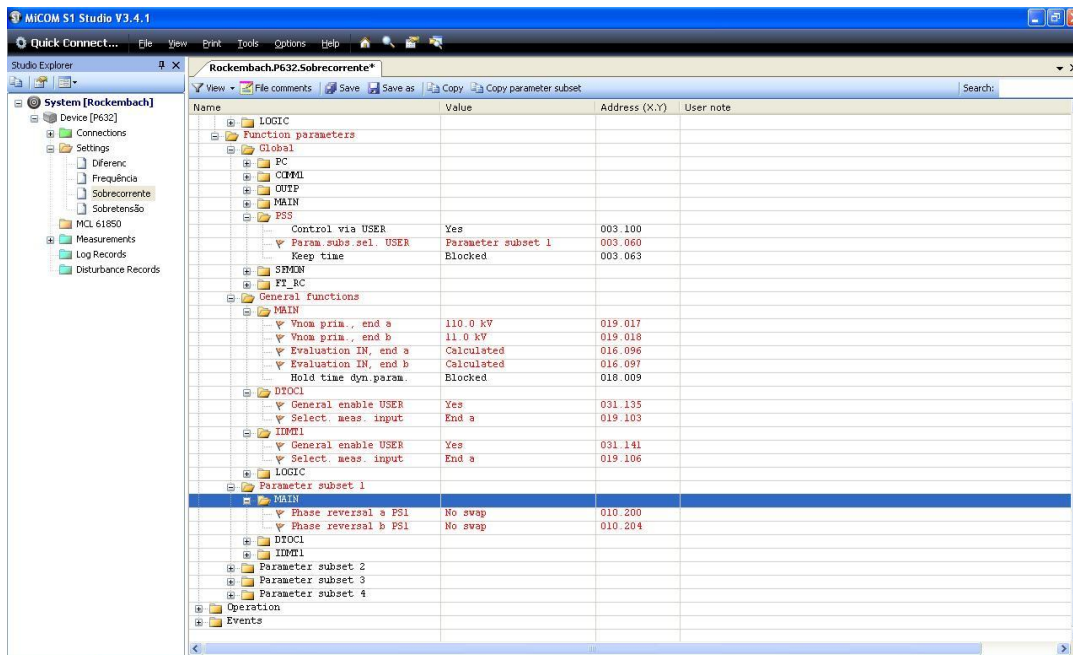


Figure 13

3.8 DTOCI

Click on the “+” sign near to “*DTOCI*” and then adjust the pick-up values and actuation time of the 50-1 and 50-2 elements.

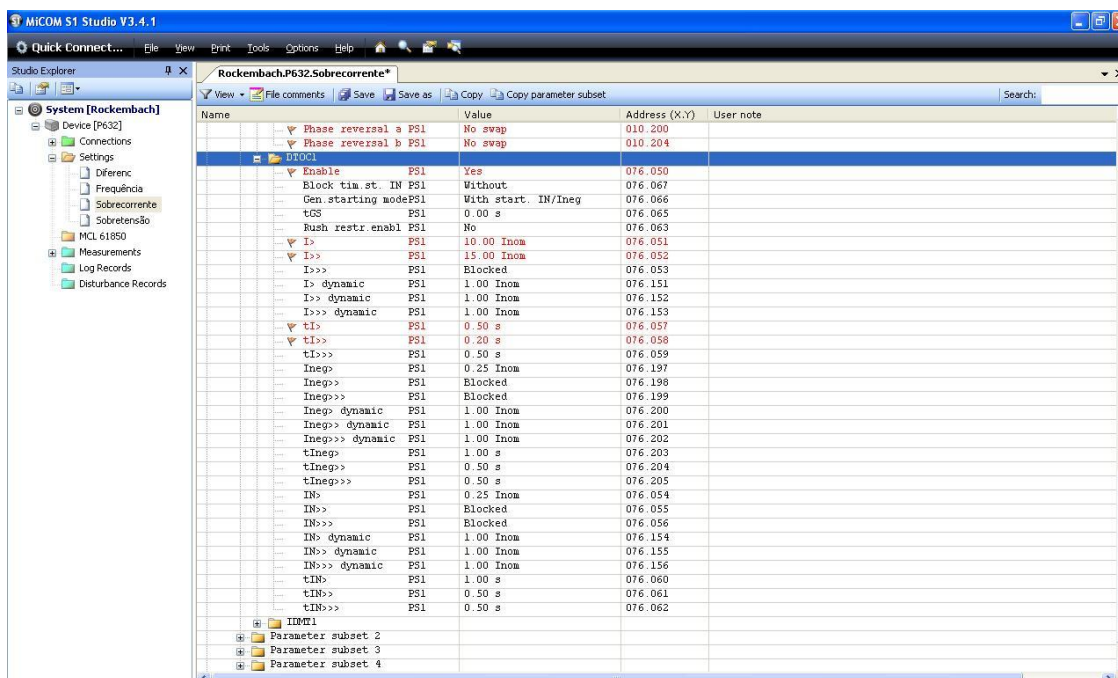


Figure 14

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3.9 IDMTI

Click on the “+” sign near to “IDMTI” and then adjust the pick-up values, time dial and curve type of element 51.

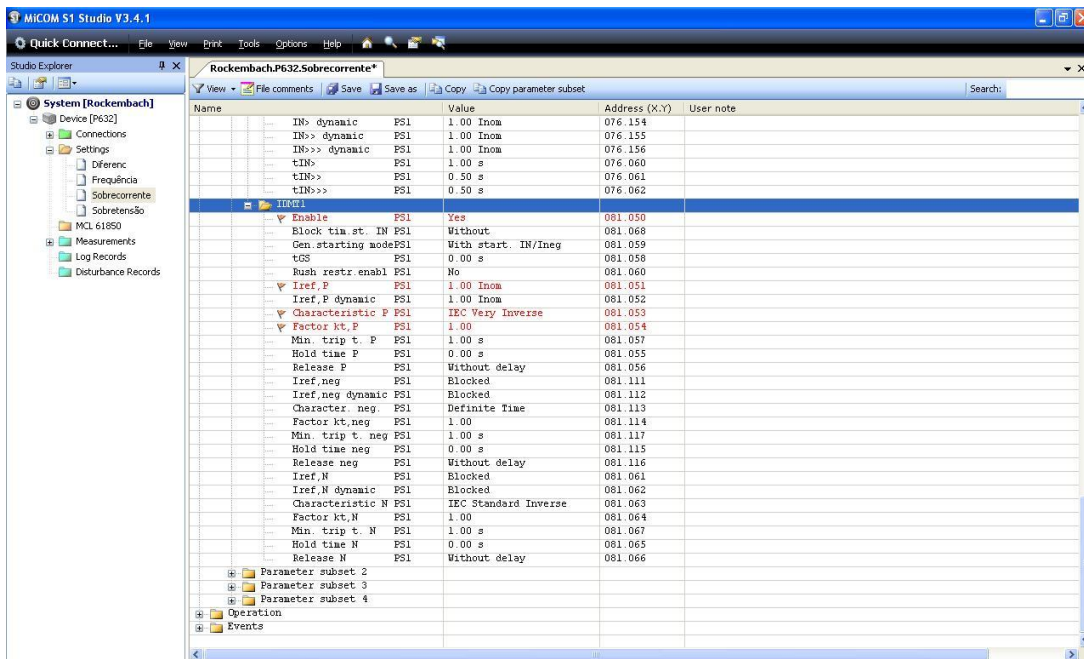


Figure 15

3.10 OUT

Click on “Config. Parameters” and then “OUT”. In this option, the binary outputs are designated with the trip signals.

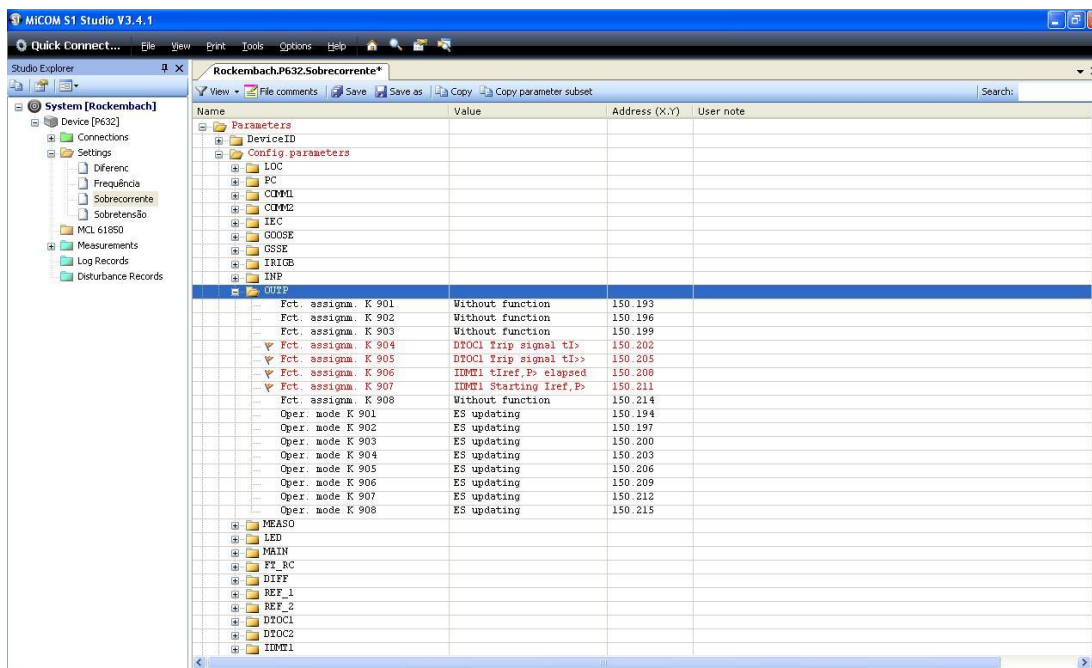


Figure 16

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After making all the adjustments, right-click on the “Parameters” folder and send the changes to the relay.

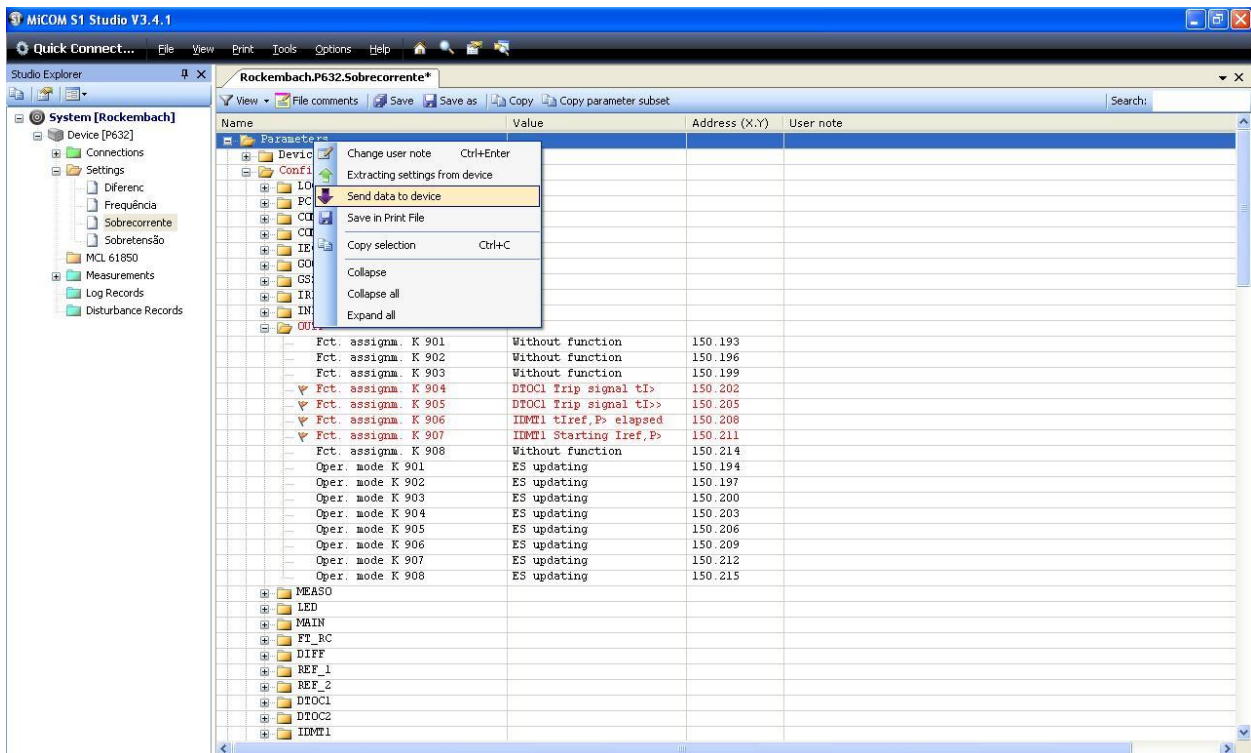


Figure 17

4. Overcurrent software adjustments

4.1 Opening the Overcurrent

Click on the CTC application manager icon.

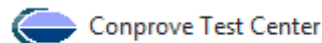


Figure 18

Make a double click on the Overcurrent software icon.

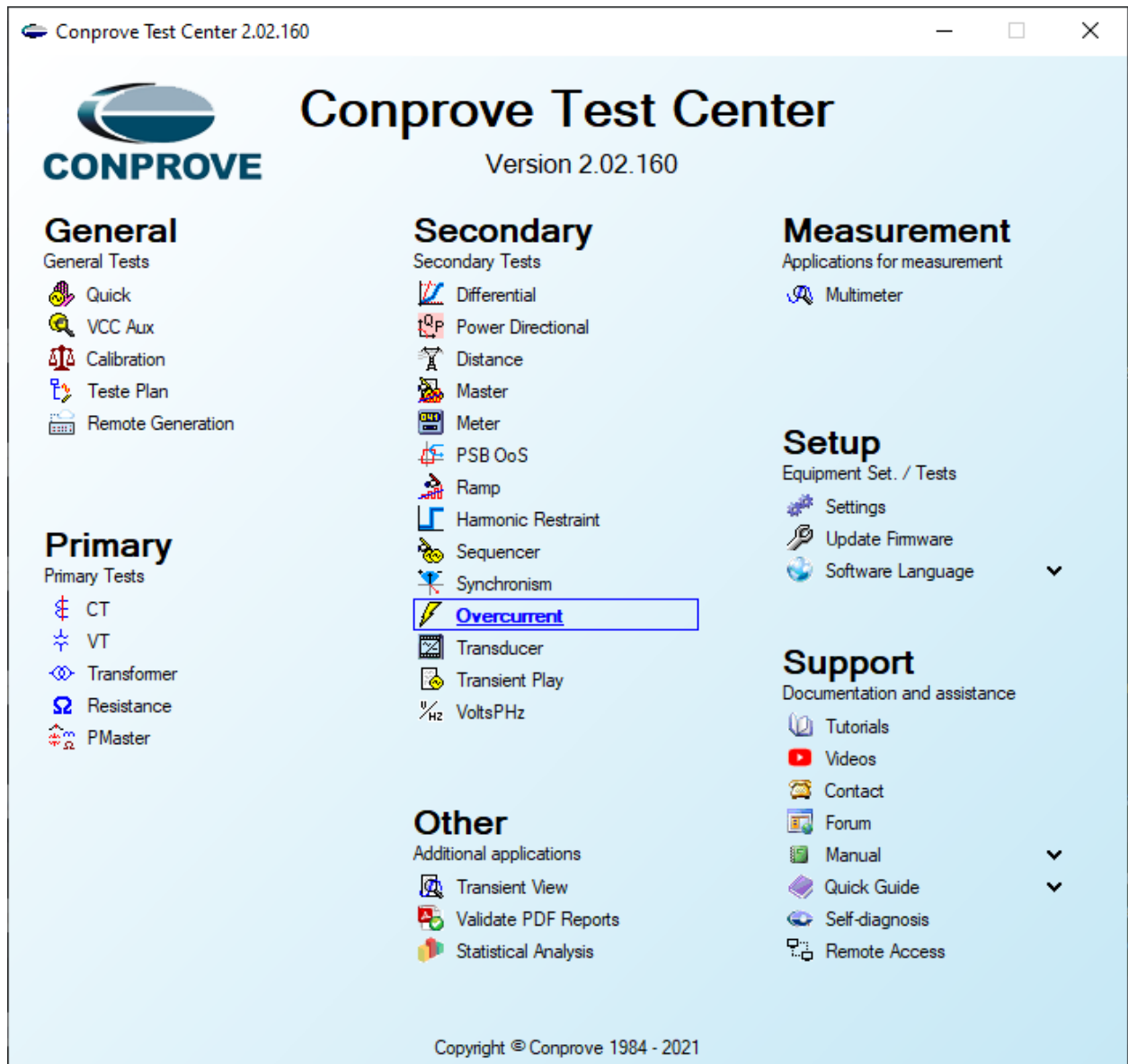


Figure 19

INSTRUMENTOS PARA TESTES ELÉTRICOS

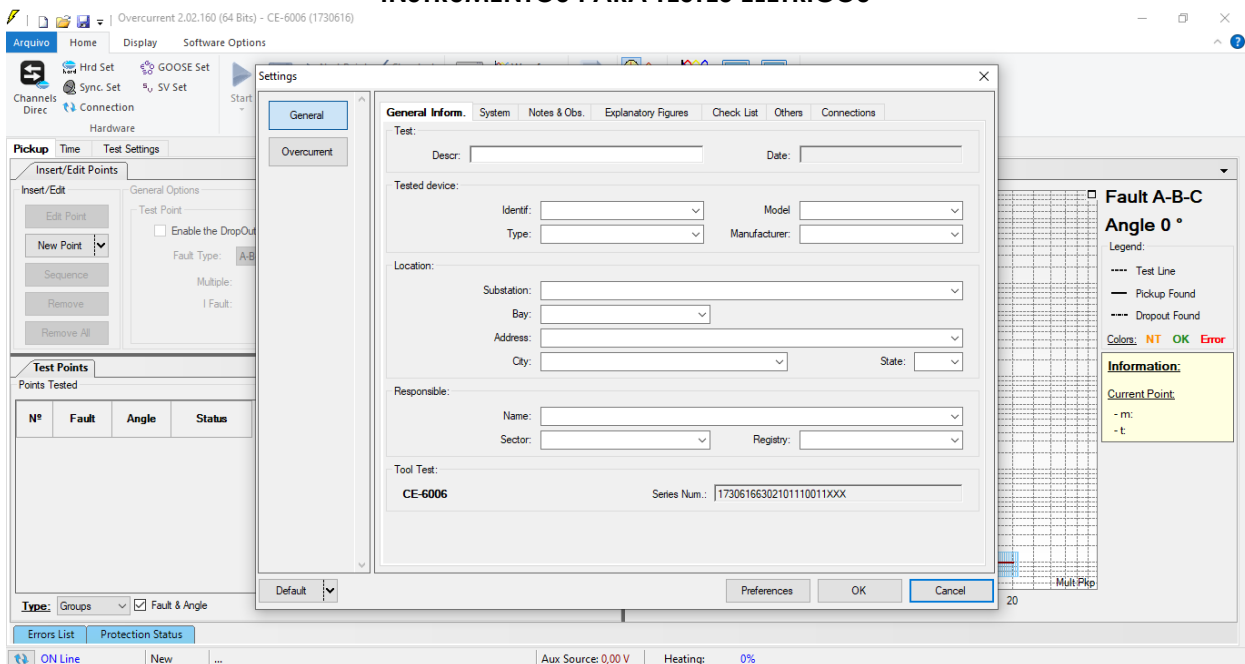


Figure 20

4.2 Configuring the Settings

When opening the software the “*Settings*” screen will open automatically (provided that the option “*Open Settings when Start*” found in the “*Software Options*” menu is selected). Otherwise click directly on the “*Settings*” icon.

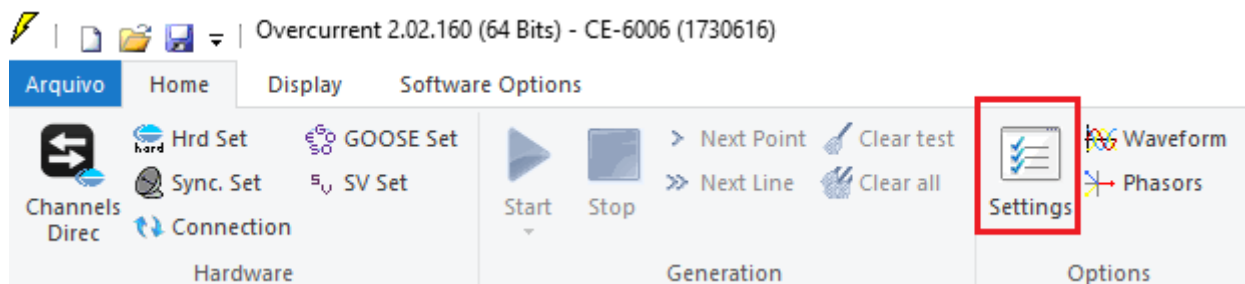


Figure 21

Inside the “*Settings*” screen, fill in the “*General Inform.*” with details of the tested device, installation location and the person responsible. This makes reporting easier, as this tab will be the first to be shown.

INSTRUMENTOS PARA TESTES ELÉTRICOS

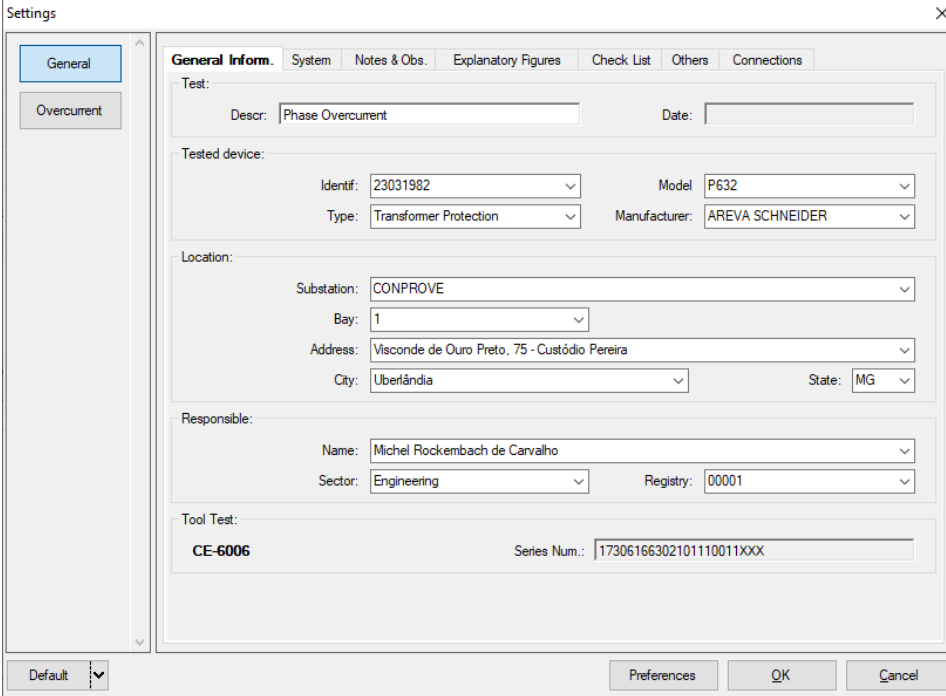
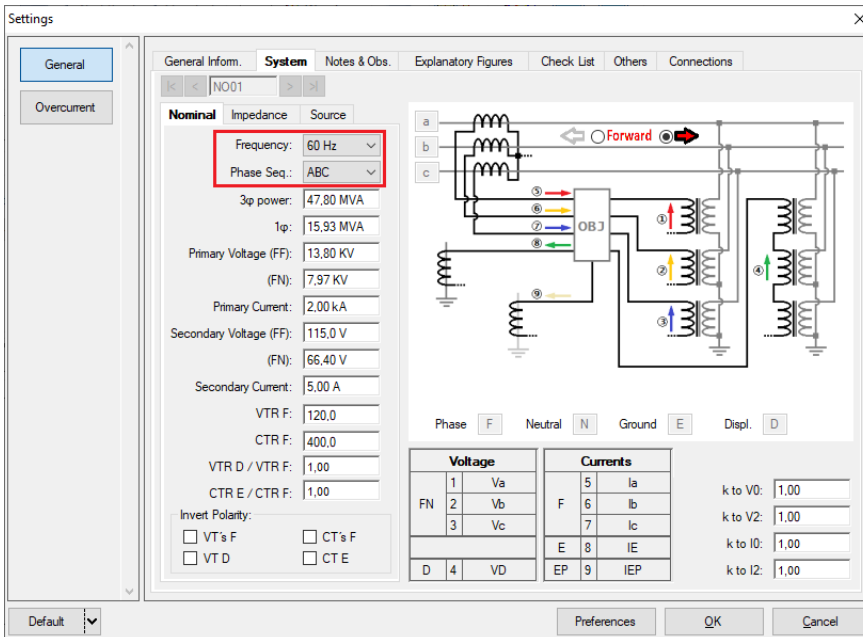


Figure 22

4.3 System

In the following screen, within the “Nominal” sub tab, the values of frequency, phase sequence, primary and secondary voltages, primary and secondary currents, transformation ratios of VTs and CTs are configured. There are also two sub-tabs “Impedance” and “Source” whose data are not relevant for this test.



Voltage		Currents	
1	Va	5	Ia
2	Vb	6	Ib
3	Vc	7	Ic
		8	IE
D	VD	9	IEP

Figure 23

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There are other tabs where the user can enter “Notes & Obs., Explanatory Figures,” can create a “Check List” of the procedures for carrying out the test and even create a diagram with all the schematic of the connections between the test set and the test equipment.

5. Overcurrent Adjustments

5.1 Overcurrent Screen > Settings

This tab adjusts whether the function has directionality, the way to view the current graph by time, the scale used and the tolerances for time, current and angle. These tolerances should be consulted in the relay manufacturer's manual.

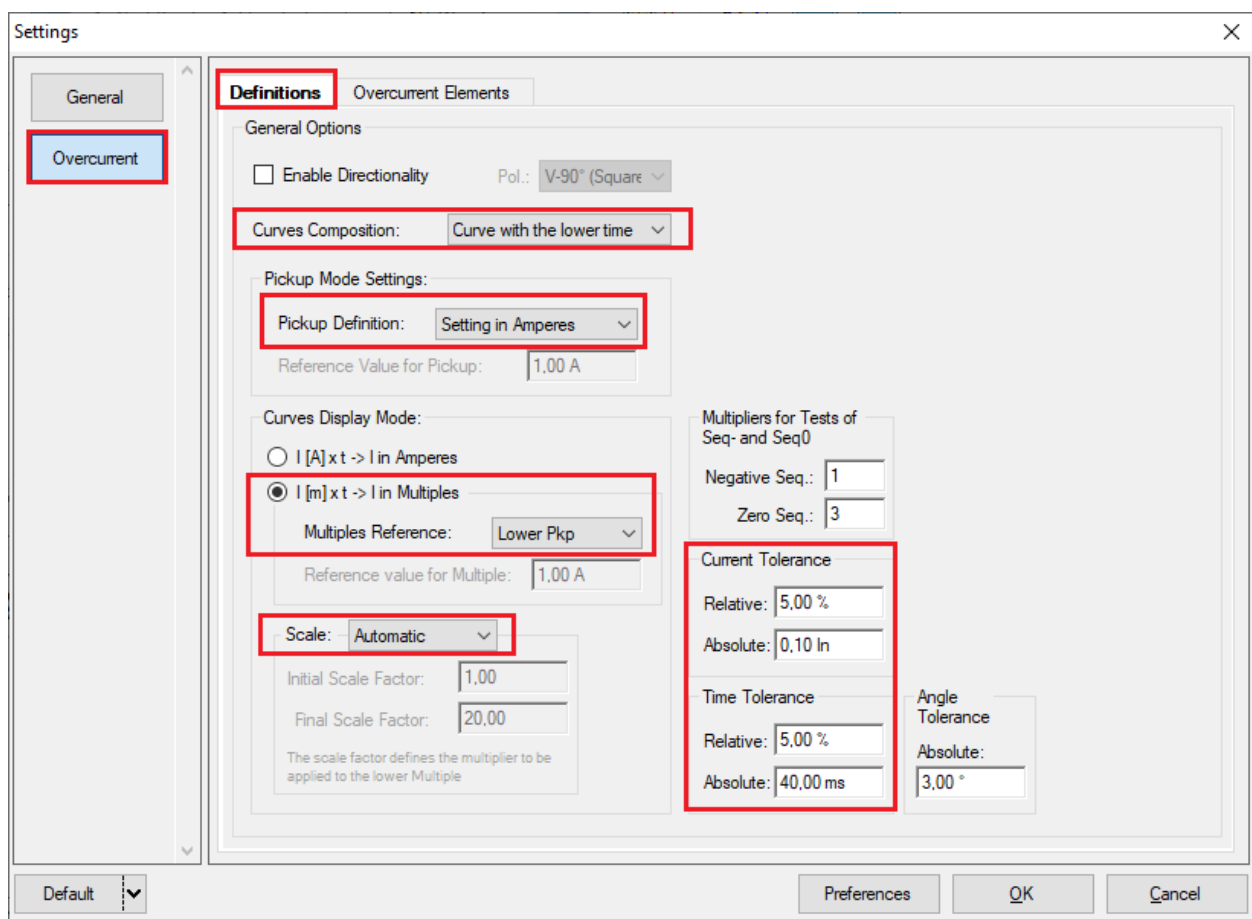


Figure 24

5.2 Overcurrent Screen > Overcurrent Elements > Phase

Here you must configure the two overcurrent elements, one with an inverse curve and one with a definite time. To do this triple clicks on the highlighted icon.

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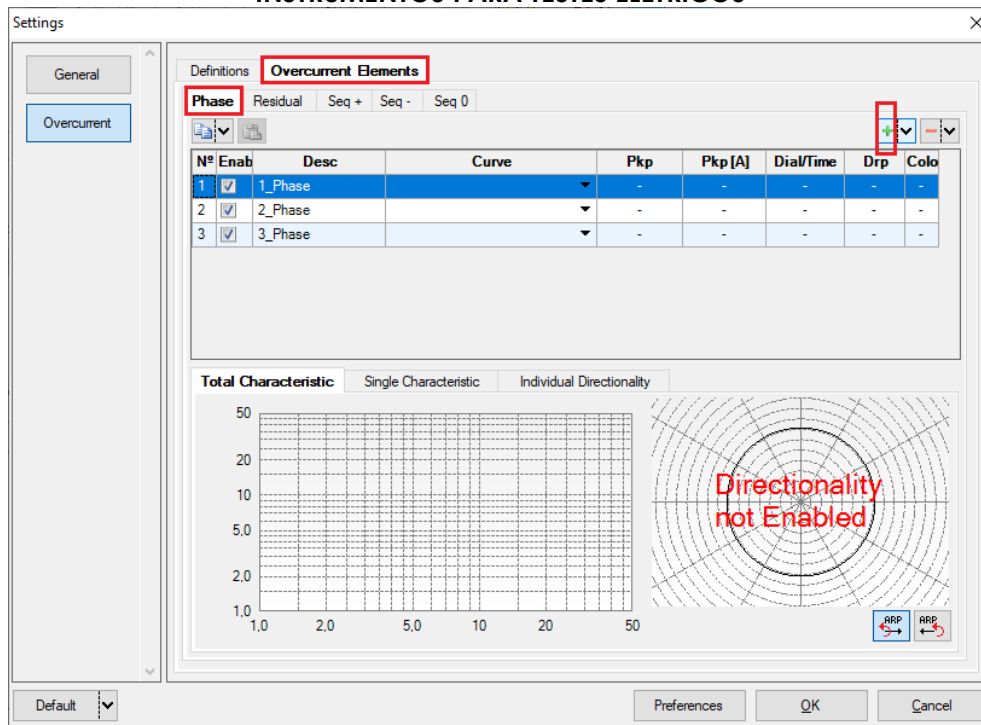


Figure 25

For the first element change the name to “ $I_{ref,P}$ ” choose the curve type, pickup value, time dial and dropout factor. Repeat the same procedure for the second and third elements changing the name to “ $I_{>}$ ” and “ $I_{>>}$ ”, choosing definite time and parameterization the values of “ P_{kp} ”, “ T_{mp} ” and “ Drp ”.

INSTRUMENTOS PARA TESTES ELÉTRICOS

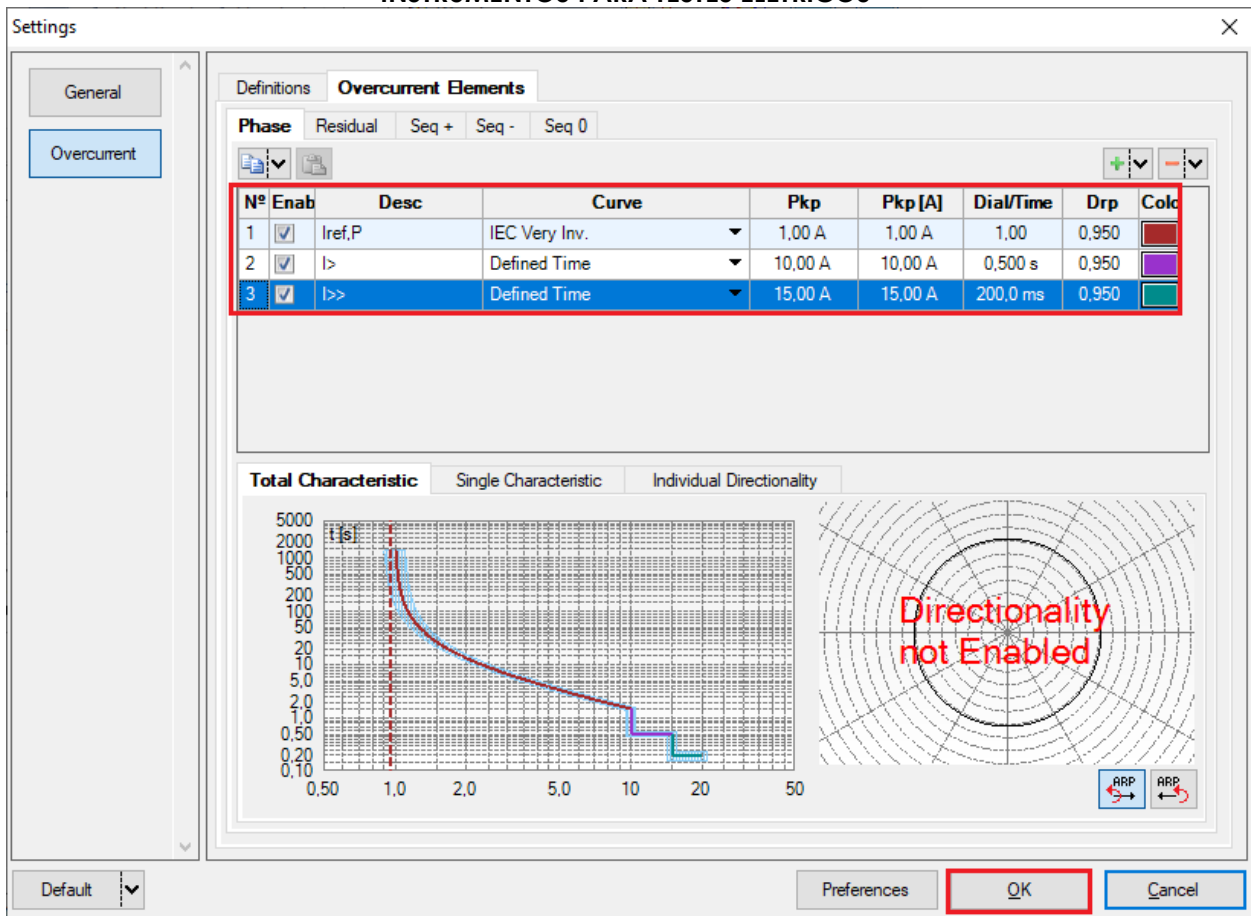


Figure 26

6. Channel Targeting and Hardware Configurations

Click on the icon illustrated below.

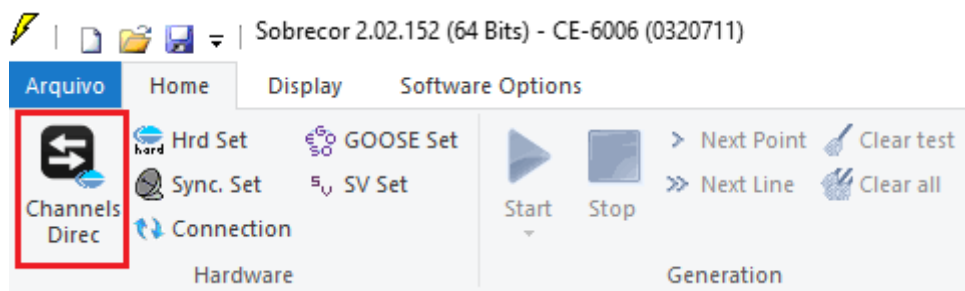


Figure 27

Then click on the highlighted icon to configure the hardware.

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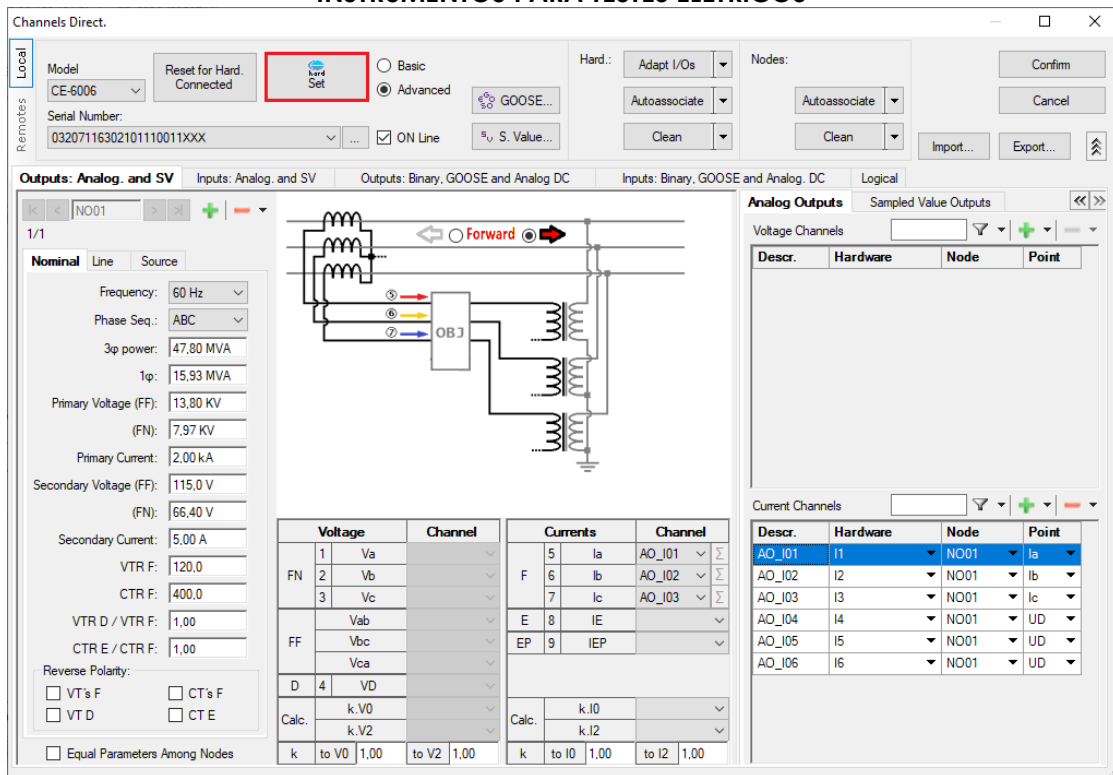


Figure 28

Choose the channel configuration; adjust the auxiliary source and the stopping method of the binary inputs. To finish click on “OK”.

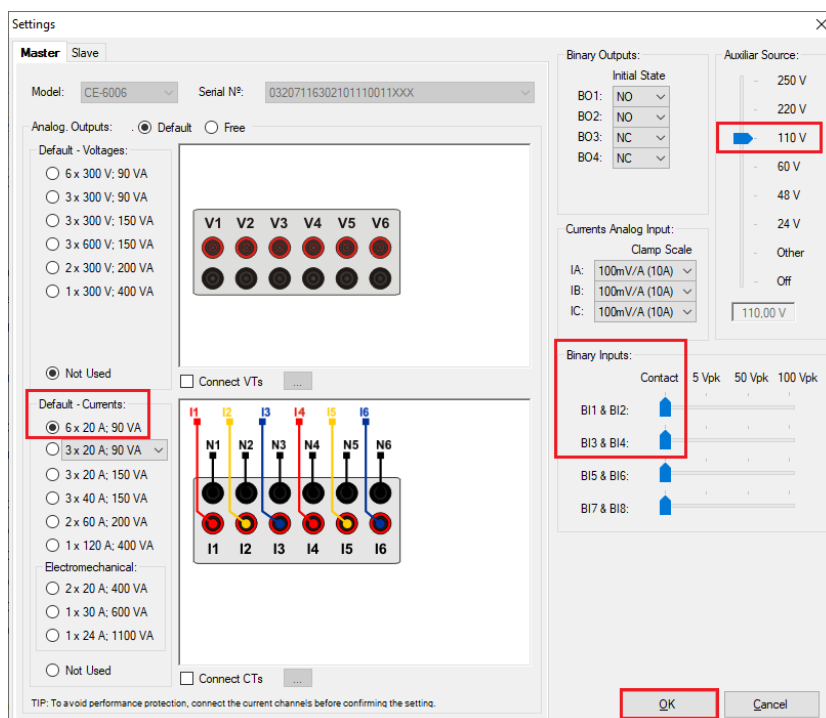


Figure 29

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On the next screen choose “Basic” and on the next window (didn’t shown) choose “YES”, finally click on “Confirm”.

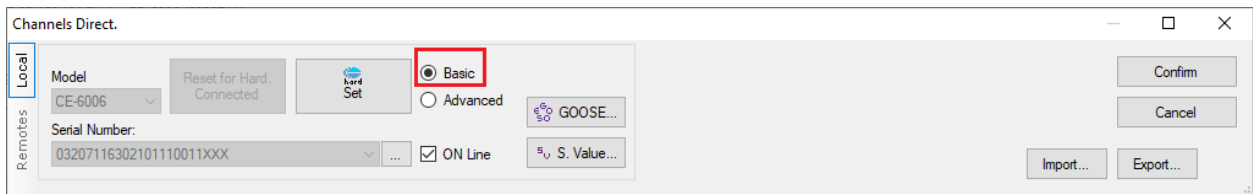


Figure 30

7. Test Structure for Function 50/51

7.1 Test Settings

On this tab you must configure the direction of pickup and trip signals with the binary inputs, in addition to configuring the generation channels. You can configure pre-faults and post-faults if necessary.

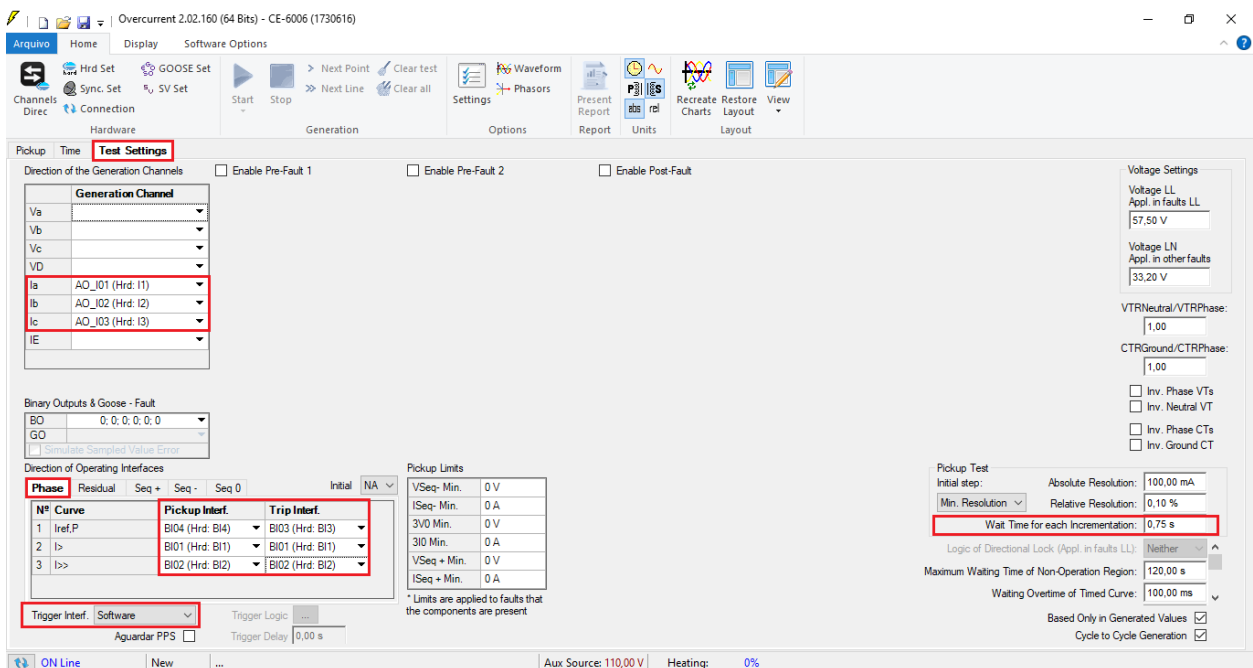


Figure 31

7.2 Pickup screen

On this tab click on “New Point” and choose the type of fault (it has all types), if you want to test dropout and the software searches for pickup and dropout fully automatically. In the figure below, the “Fault Type” ABC was chosen.

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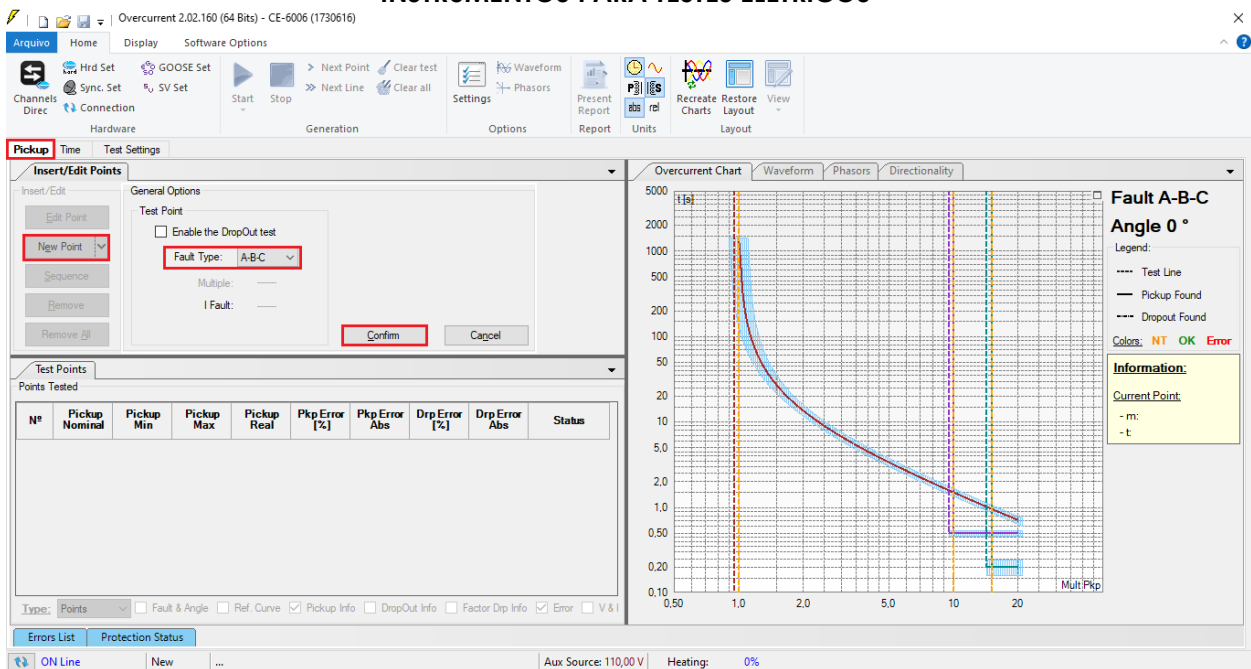


Figure 32

Start the generation by clicking on the icon highlighted below or using the command “*Alt + G*”.

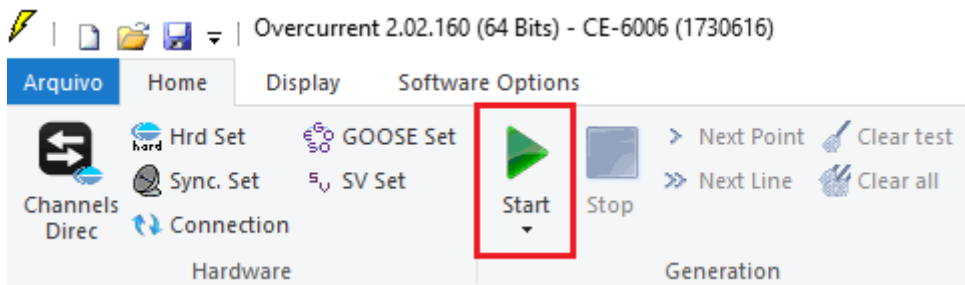


Figure 33

7.3 Final Result of the Pickup Test

In this test, the values found for pickup, dropout, and percentage and absolute errors can be viewed in order to pass or fail the test. Other options are generated values, dropout factor, reference curve, angle and fault.

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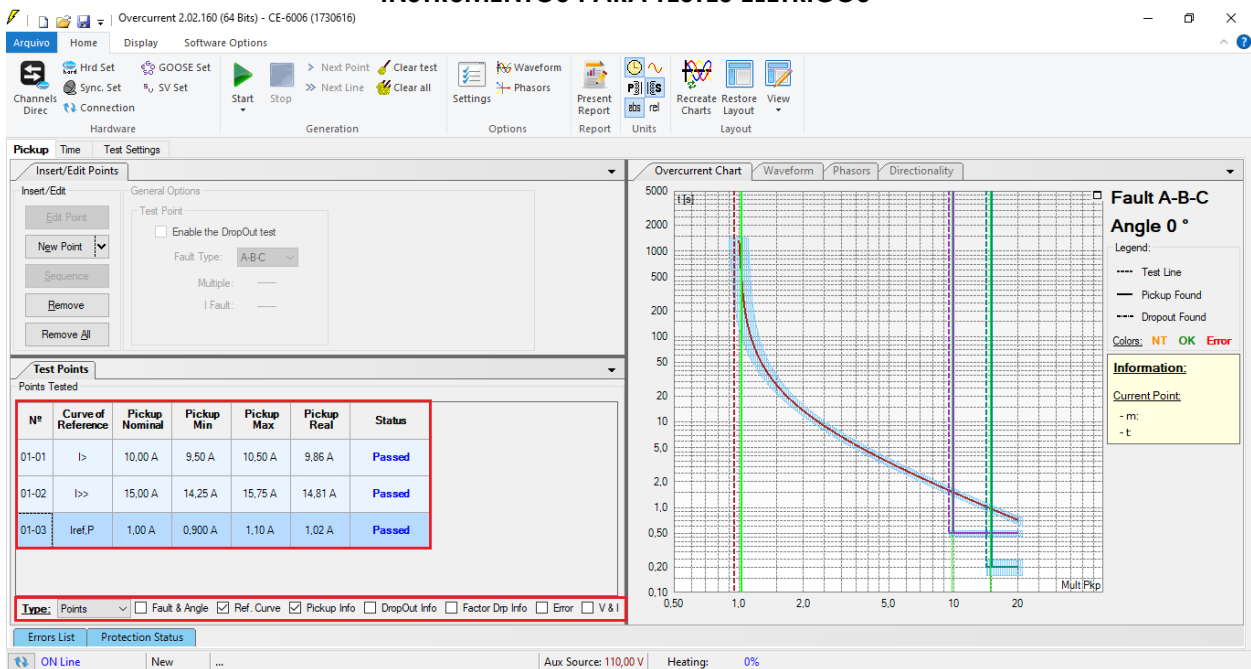


Figure 34

7.4 Time screen

On this tab, the operating times are evaluated. As the binary outputs of the curve and set time are separated there will be two or three evaluations of time in higher ratings to 10,0A /15,0A (one time for each element). For convenience, a sequence of current values will be inserted for time evaluation. It was chosen value 1,00A as the initial value, 20,00A and the final value 2,00A as increment step and the fault ABC.

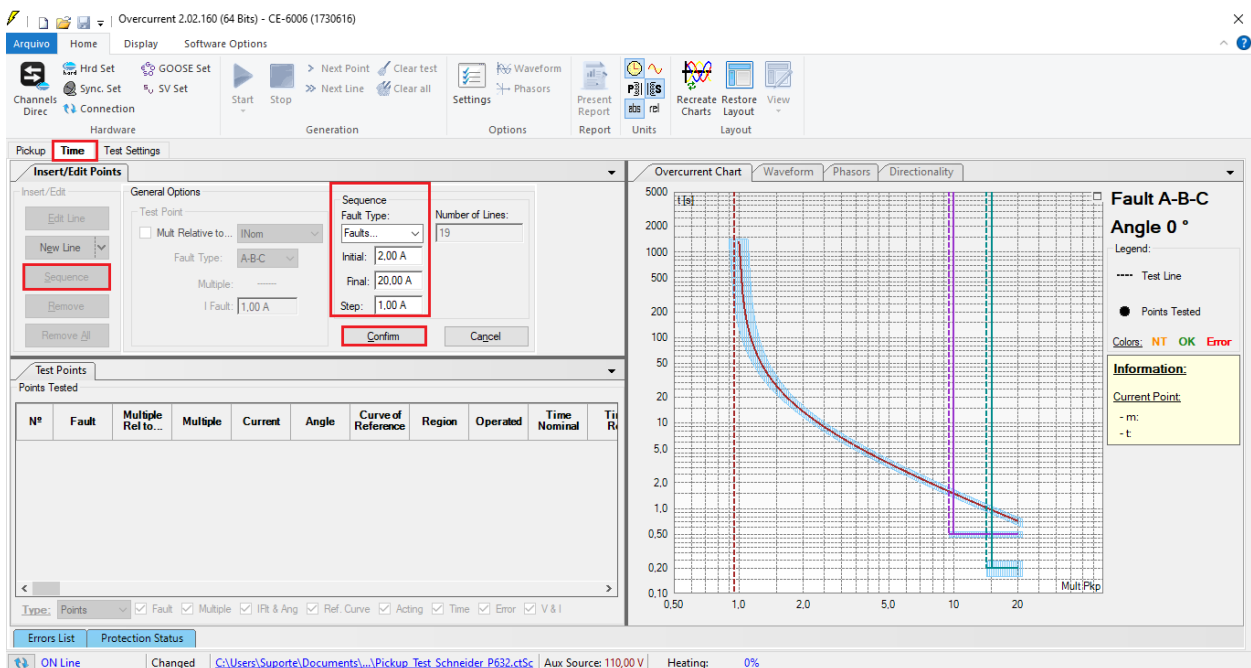


Figure 35

INSTRUMENTOS PARA TESTES ELÉTRICOS

Start the generation by clicking on the icon highlighted below or using the command “*Alt + G*”.

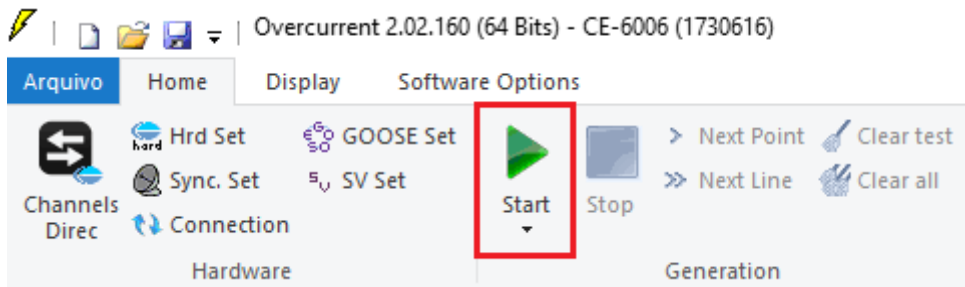


Figure 36

7.5 Final Result of the Time Test

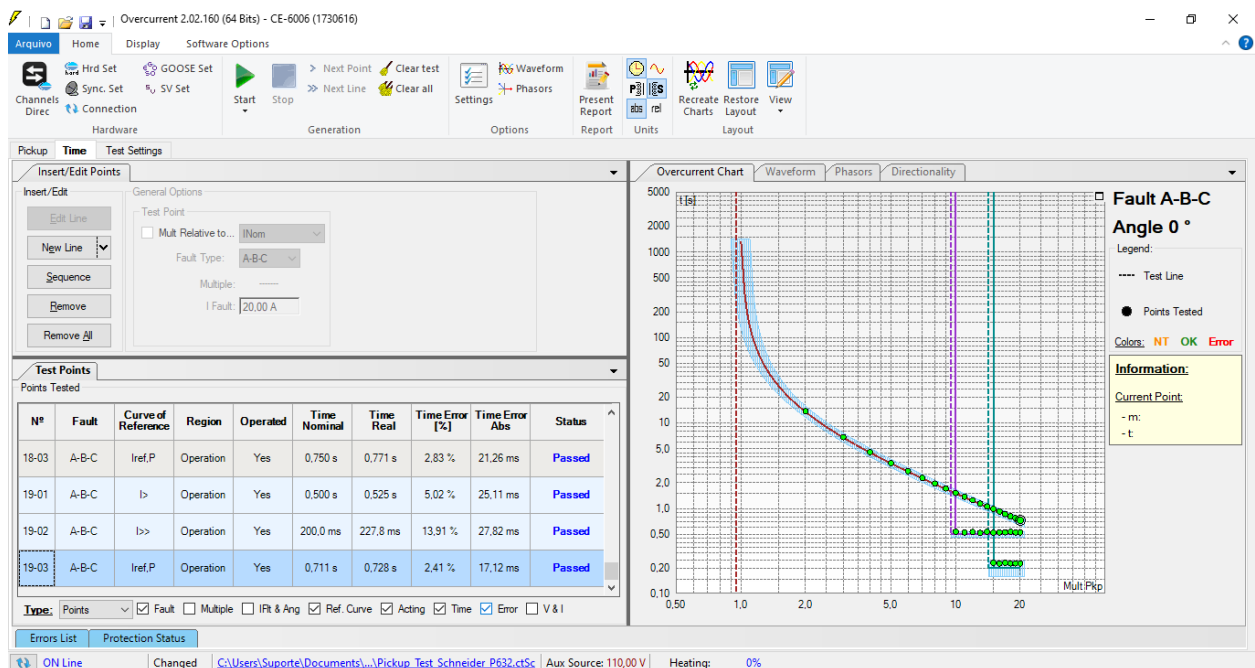


Figure 37

It is verified that all operating times are within the range allowed by the relay manufacturer.

8. Report

After finishing the test, click on the “*Present Report*” icon in the previous figure or through the command “*Ctrl + R*” to call the report pre-configuration screen. Choose the desired language as well as the options that should be part of the report.

INSTRUMENTOS PARA TESTES ELÉTRICOS

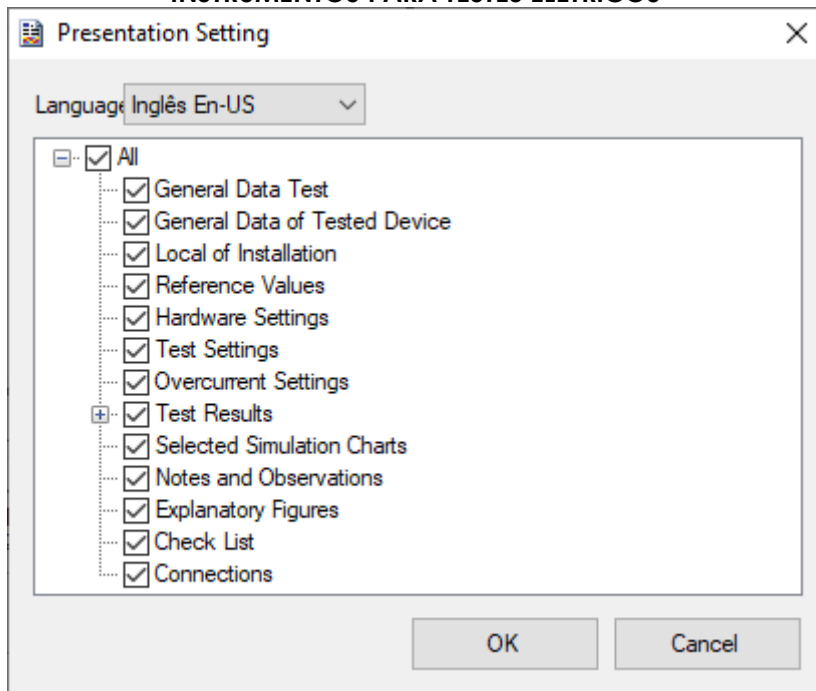


Figure 38

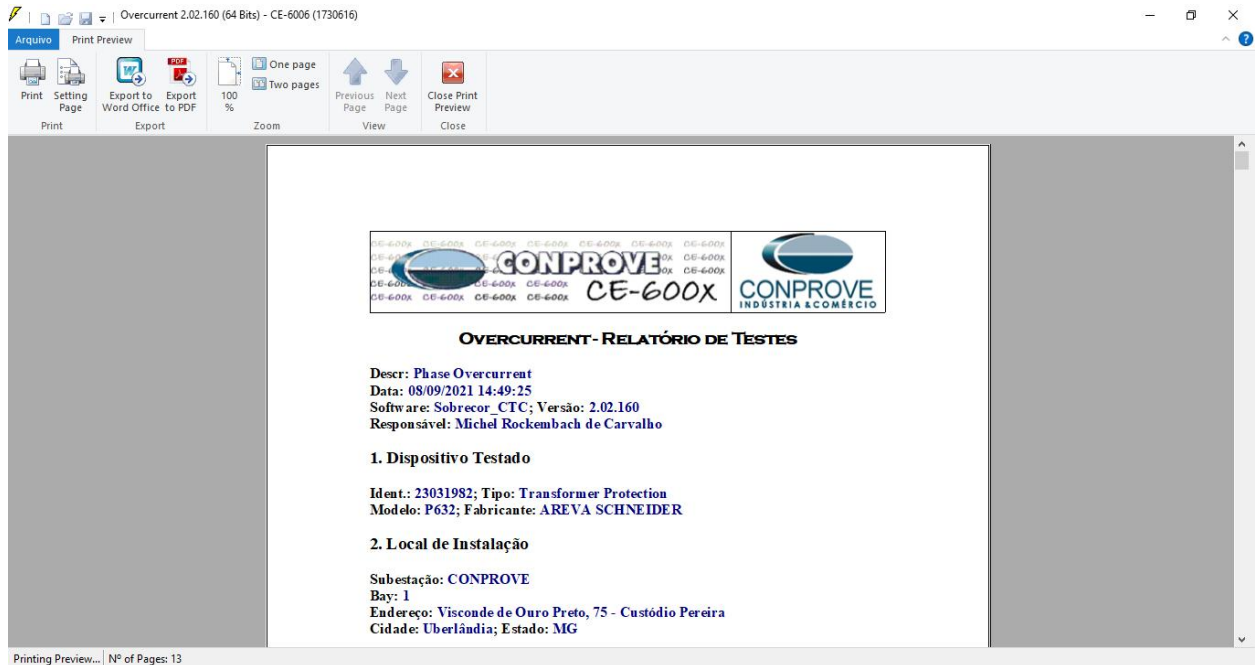


Figure 39

INSTRUMENTOS PARA TESTES ELÉTRICOS

APPENDIX A

A.1 Terminal Designations

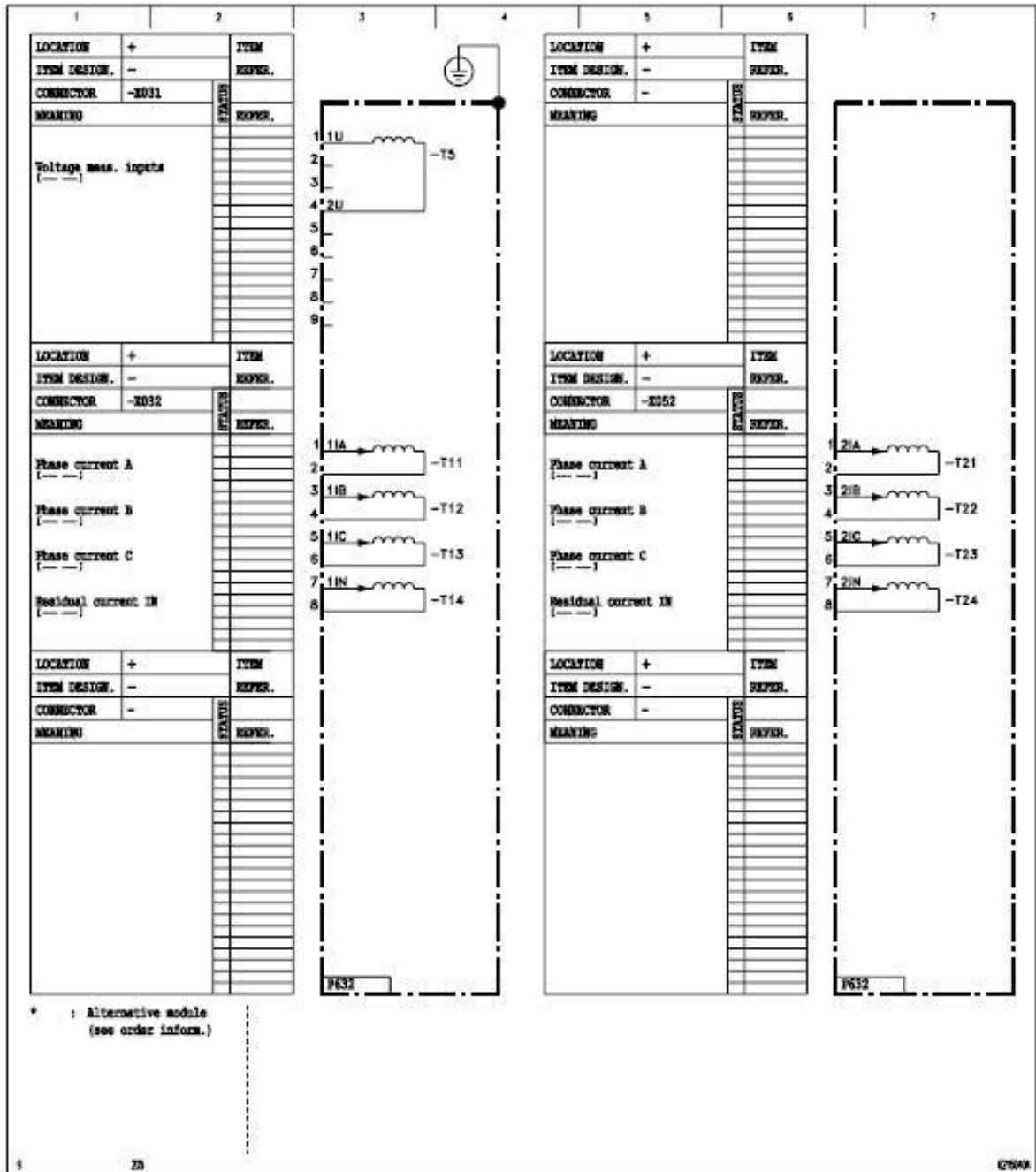


Figure 40

A.2 Technical data

Definite-time and inverse-time overcurrent protection

Deviation: $\pm 5 \%$

Definite-time stages

Deviation: $\pm 1 \%$ + 20 to 80 ms
Software version -603 and up:
Deviation: $\pm 1 \%$ + 20 to 40 ms

Inverse-time stages

Deviation for $I \geq 2 I_{ref}$: $\pm 5 \%$ +10 to 25 ms
For IEC characteristic 'extremely inverse': $\pm 7.5 \%$ +10 to 20 ms

APPENDIX B

Equivalence of software parameters and the relay under test.

Table 1

Overcurrent Software		P632 Relay		
Parameter	Figure	Parameter	Address	Figure
Frequency	23	Nominal frequ. f_{nom}	010.030	09
Phase Seq.	23	Phase sequence	010.049	09
51				
Pkp	26	I_{ref}, P	081.051	15
Dial / Time	26	Factor k_t, P	081.054	15
Curve	26	Characteristic P	081.113	15
50-1				
Pkp	26	$I >$	076.051	14
Dial / Time	26	$t_l >$	076.057	14
50-2				
Pkp	26	$I >>$	076.052	14
Dial / Time	26	$t_l >>$	076.058	14