

TEST TUTORIAL

EQUIPAMENT: Protection Relay.

BRAND: ZIV.

MODEL: DLF.

FUNCTION: 81u or PTUF – Underfrequency & 81o or PTOF – Overfrequency.

TOOL: CE-6003, CE-6006, CE-6707, CE-6710, CE-7012 or CE-7024.

OBJECTIVE: Testing the pickup and operating time of the underfrequency and overfrequency elements using the Ramp software.



VERSION CONTROL:

Version	Descriptions	Date	Author	Reviewer
1.0	Initial Version	27/07/2022	M.R.C.	G.C.D.P.



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Statement of responsibility

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Suggestions for improvement of this material are welcome, just user contacts 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 test 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 is noted that the user must have satisfactory training in maintenance procedures a good knowledge of the equipment under test and still be aware of safety rules and regulations.



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PROCEDURE FOR TESTING THE ZIV DLF RELAY IN THE RAMP SOFTWARE

1. Relay Connection to CE-6710

In this section, all the connections necessary to run the test in question are discussed. In appendix B of this document you can find the terminal designations of the ZIV DLF relay used.

1.1. Auxiliary Source

To power the relay, connect the positive (red) terminal of the Aux Vdc source in the test set to terminal 3 of slot A of the relay and the negative terminal (black) to terminal 2 of slot A, as shown in the following figure.



Figure 1

1.2. Analog Outputs

Connect the CE-6710's analog outputs V1, V2 and V3 to terminals 01, 03 and 05 of the relay's D slot and their common to terminals 02, 04 and 06. The figure below shows the procedure.





Figure 2

1.3. Binary Inputs

Connect the Binary Inputs to the binary outputs of the relay in slot A as shown in the table and figure below.

CE-6710 (<i>Binary Inputs</i>)	DLF (<i>Slot A</i>)				
BI1	OUT 1 (07 and 08)				
BI2	OUT 2 (09 and 10)				
BI3	OUT 3 (11 and 12)				
BI4	OUT 4 (13 and 14)				

Table 1





Figure 3

2. First steps with the DLF relay

2.1. Communication between PC and relay

Communication with the relay is done through an Ethernet cable connected between the relay and the computer that has the ZivercomPlus software. Double click on the relay software icon.





Figure 4

Enter the username and password. To gain access use *"zivercom"* and the password *"ziv"*.

🎌 Identification		×
User	zivercom	
Password	×××	
Access level		v
	OK	Cancel

Figure 5

Then, from the main menu, go to "IEDs" > "Installations".

🔣 ZlVercomPlus-2.13.3.0 db[3.47.3.0]							
File	View	IEDs	Configuration	Help			
		1- S/S Example					
		Emulate					
1							

Figure 6

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Select the default file "SubExamples.sds" and click "Edit".

🔣 Installations				×
Look in:	substations	•	← 🗈 📸 🎟 -	
4	Nome	^		Data de modifica
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٢				
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	Path C: \Users\Suporte\D Preview	ocuments\ZIV\ZIVercomPlus\substatio	ns\SubExample.sbs	Communicate
	C # # File 1 S/S Example 1 # Protoc 2 # Tipo de 1 #(UCS 2 0 # (ipv4= 184.0.0.10 32001 , 5000 #	/ersion # # Subestation Text ol e comunicación (2, red) IV=0, Transparente=1, telnet=2) 0, ipv6=1) # IPv4 Puerto TCPIP, t mensaje red		

Figure 7

The next step is to check the data set for communication on the relay front panel. This data must be entered into the software for successful communication to occur.



Modify Installation
Installation Text
S/S Example OK
Protocol: PROCOME30 💌 Communication type: LAN 💌 🔒 Cancel
SERIAL Baud rate and associated parameters Port: COM1 Baud rate: 38400
Data bits: 8 - Set default values TYES
Stop bits: 1 Time between retries 1000
Parity: Even v Message time (ms) 80 Number of retrys 3
PSTN
Modem: Telephone
LAN Transparent IP Address: 10.0.0.184 Port: 32001 Message time (ms) 5000

Figure 8

By clicking on the *"OK"* button, you will return to figure 7, select the file again and click on *"Communicate"*.

👪 Installations			×
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4	Nome	^	Data de modifica
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	Path C:\Users\Suporte\D	ocuments\ZIV\ZIVercomPlus\substations\SubExample.sbs	Communicate
	Preview	Mania -	
	C # # File S/S Example 1 # Probo 2 # Tipod 1 #(CS2 0 # (pv4= 1840.0.10 32001 ,5000 #	Version # # Subestation Text ol comunicación (2, red) IV=0, Transparente=1, teinet=2) 0, pro€=1) # IP∨4 Puerto TCPIP, t mensaje red	



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Click "OK" again.



Figure 10

If the field "Communications type" is configured as "LAN-TLS", a second level of access will be requested, use the default user "admin" and the default password "Passwd@02".



р Dirección: 0						
User: (MAX=32)						

Password: (MAX=32)						
*******	OK					
	UK	Lancel				

Figure 11

3. Parameterization of the ZIV DLF relay

3.1. Nominal Values

Click on the highlighted "+" signs until you reach the "Nominal Values" option. In this option, set the nominal voltage as 115.0V, nominal phase current as 5.0A and nominal frequency as 60.00Hz.



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X	Group 1 💽 Group 1	active 🥂 🖺 🗈	🖬 🛸 🏯 📄	\S/	S Example\000-DLFA-2A2473BZ000000XD>	K0-2010551\Settings\Nomina	l Values
S/S Example - S/S Example - - - - - - - - - -	Text Text Ext Second	1T Current value = 5 = 5 = 110 = 50 = 50 = 100 = 50 = 100 = 1000 = 100 = 1000 = 100 = 100 = 1	Nevvalue	4 A B	Information (Cause device reboot)mine 1, max = 5, ince 1, (Cause device reboot)mine 1, max = 5, ince 1, (Cause device reboot)mine 1, max = 5, ince 1, (Cause device reboot)mine 50, max = 230, inc (Cause device reboot)mine 50, max = 60, inc =		
					TD RD	logs 🗸 🔆 🗩 🔓 01/22/2021	12:06

Figure 12

To change the voltage and frequency value, click on the icon highlighted in green in the previous figure.

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	🔳 🔁 🗗 Group 1 🖃	Group 1 active 🛛 🔨 遇 🖬 📓 🖆	i 🗃 🛛 🖓	/S Example\000-DLFA-2A2473BZ000000XD	X0-2010551\Settings\Nominal Valu	ies
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						_
<u>ن</u>				TD 🔲 RD	📕 logs 🗸 🍂 🔎 📴 01/22/2021 12:08	//

Figure 13

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After changing the new values, click again on the icon highlighted in green in the previous figure to send the adjustment to the relay.

3.2. General

Click on the *"General"* option and configure the transformer ratios of the phase, neutral, voltage transformer current transformers and the phase sequence.

iew IEDs Configuration Help					
	🔚 🖶 🖶 Group 1 🔹 Gr	oup 1 active 💁 🖺 🔯	🔒 🛎 🎒	\S/S Example\000-IDFA-2A24732C	000000XXX0-2010752\Settings\0
🛙 S/S Example 🔒	Text	1T Current value	New value	Units Information	
- 000-IDFA-2A24732C000000000000000	- ab Name	÷		Max cars=20, def=	
Status Generation	ab Breaker	2		Max cars=5, def=	
E- gy Settings	- ab Division	#		Max cars=64, def=	
	ab Zone	# (1)		Max cars=64, def=	
Date and Time	- Bb Description 1	-		Max cars=64, def=	
Synchronization	- BD Description 2	# (1)		Max cars=64, def=	
	- Operation Mode	#		0=On, 1=Blocked, 2=Test, 3=Test blocked, 4=.	
General	- 🗵 Phase 1 CT Ratio	# (1)		min=1, max=100000, inc=0.01, def=1	
General Trato	- 🗵 Phase 2 CT Ratio	#		min=1, max=100000, inc=0.01, def=1	
🕀 🃲 Protection	- EP Ground C.T. Ratio	-		min=1, max=100000, inc=0.01, def=1	
Trip Enable	- 🗵 Phase VT Ratio	2		min=1, max=100000, inc=0.01, def=1	
	- Phase Sequence	-		0=ABC, 1=ACB, def=ABC	
	🖽 📑 Angle Reference				
Coll Circuit Supervision	🖽 📑 Invert Polarity	#			
Schedule of Time	PLL Enable			0=No, 1=Yes, def=Yes	
B Buttons P1-P6	Simultaneous Commands	#		0=No, 1=Yes, def=Yes	
Voltage Transducer Monitoring					
Records					
Control Directions					
⊞					
	1				



It can be seen in the previous figure that the values in the column *"Current Value"* and *"New value"* are hidden. To allow visualization and configuration click on the buttons highlighted in red and then green.



ZIVercomPlus-2.13.3.0 db[3.47.3.0]				– 🗆 ×
File View IEDs Configuration Help				S
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Configuration	ab Breaker	#	Max cars=5, def=	
E Settings	ab Division	÷	Max cars=64, def=	
	ab Zone	÷	Max cars=64, def=	
Date and Time	ab Description 1	÷	Max cars=64, def=	
Synchronization	ab Description 2	÷	Max cars=64, def=	
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	- KP Phase 2 CT Ratio		min=1, max=100000, inc=0.01, def=1	
🖶 📲 Fault Locator	- KP Phase 3 CT Ratio		min=1, max=100000, inc=0.01, def=1	
E Protection	- 🖅 Ground C.T. Ratio	÷ 1	min=1, max=100000, inc=0.01, def=1	
Hecloser	- EX Parallel CT Ratio	÷ 1	min=1, max=100000, inc=0.01, def=1	
Breaker Supervision	- 🖅 Phase VT Ratio	÷ 1	min=1, max=100000, inc=0.01, def=1	
🕀 📲 📲 Coil Circuit Supervision	- 82 Busbar VT Ratio		min=1, max=100000, inc=0.01, def=1	
Schedule of Time	- EP Ground VT Ratio	# 1	min=1, max=100000, inc=0.01, def=1	
	- 🖶 Capacitive VT	# No	0=No, 1=Yes, def=No	
Voltage Transducer Monitoring	- 🛨 Phase Sequence	# ABC	0=ABC, 1=ACB, def=ABC	
Records	- 🛨 IG Type	# IG	0=IN, 1=IG, def=IG	
Control Operations	🖽 📲 Angle Reference	#		
E-B Records	B- P Invert Polarity	#		
	- 🖶 PLL Enable	# Yes	0=No, 1=Yes, def=Yes	
	🛛 🗄 Simultaneous Commands	# Yes	0=No, 1=Yes, def=Yes	
, (i)	1		TD RD Ings 🗸 🐝 🔾	01/22/2021 12:17
~				

Figure 15

3.3. Frequency

Select the *"Frequency"* option, there are several adjustments that directly impact the timing of the under and overfrequency functions. For more details, consult the relay manufacturer's manual.



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🗈 📲 Inputs Outputs LEDs 🛛 🔨	Text	1T Current value	New value	Units Information								
🕀 📲 System Impedances	— 🔛 Inhibit Voltage	4	4	V min=4, max=150, inc=0.01, def=4								
Baut Locator	- 🖾 Pickup Activation Timer	6	6	half min=3, max=30, inc=1, def=6								
	- 🔛 Reset Time	0	0	cycls min=0, max=10, inc=1, def=0								
	🗕 🖶 Load Shedding Enable	No	No	0=No, 1=Yes, def=No								
Distance Supervision	 Load Shedding Type 	Underfrequency	Underfrequency	0=Underfrequency, 1=ROC Frequency, def=U								
	 RMS supervision 	Yes	Yes	0=No, 1=Yes, def=Yes								
- = 5 → Cad Line Detector - 5 → Load Encroachment - 5 → Fower Swing Detector - 5 → 5 → Femote Open Breaker Detector 5 → 5 → 5 → Directional	- 🖾 Time of differentiation	7	7	half min=7, max=25, inc=1, def=7								
	- 🖾 Frequency filter time	1	1	half min=1, max=25, inc=1, def=1								
	🗈 🚰 Overfrequency											
	🗈 🚰 Underfrequency											
Overcurrent	🖻 📲 Frequency Rate of Change											
Frequency												
🗈 🚽 🚽 Protection Scheme												
🕀 — 📲 Hot Spot Thermal Unit												
Overload												
Breaker Failure												
🕀 📲 🖶 Synchrocheck												
Bole Discrepancy												
Phase Selector												
Voltage Transformer Supervision												
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				TD 🔳 RD 📕 logs 🗸 🐳	1/28/2021 08:27:30							



3.4. Overfrequency > Unit 1

Click on the "+" signs until you reach the "Unit 1" option. In this option, the function must be activated and the pick-up values, the operating time and the reset time must be adjusted. Activate the unit with a pick-up value of 61.0Hz, operation time of 2.0s and zero reset time (0.0s). Submit the adjustments by clicking on the icon highlighted in green.





Figure 17

3.5. Overfrequency > Unit 2

Select the *"Unit 2"* option, then activate the function and adjust the pick-up values, operating time and reset time. Activate the unit with a pick-up value of 62.0Hz, operating time of 1.0s and zero reset time (0.0s). Submit the adjustments by clicking on the icon highlighted in green.







3.6. Underfrequency > Unit 1

Click on the "+" signs until you reach the "Unit 1" option. In this option, the function must be activated and the pick-up values, the operating time and the reset time must be adjusted. Activate the unit with a pick-up value of 59.0Hz, operating time of 2.0s and zero reset time (0.0s). Submit the adjustments by clicking on the icon highlighted in green.







3.7. Underfrequency > Unit 2

Select the *"Unit 2"* option, then activate the function, adjust the pick-up values, the operating time and the reset time. Activate the unit with a pick-up value of 58.0Hz, operating time of 1.0s, and zero reset time (0.0s). Submit the adjustments by clicking on the icon highlighted in green.







3.8. Outputs

In order to test the pickup and the operating time of the overfrequency and underfrequency functions, 4 relay output binaries will be used to collect these signals by the test set. In the figure below, configure the first output with the trip signals of the 81o-1 unit.



W ZIVercomPlus-2.13.3.0 db[3.47.3.0]					- 🗆 X
File View IEDs Configuration Help					8
	🔳 🗗 🗗 Group 1 💽 Group 1	active 🛛 🔁 🖳 📭	🖬 🛸 🎒 📗	tings\Inputs Outputs LEDs\Outputs\Slo	: A\Digital Output 1\Logic OR signals
S/S Example ▲ □ ■ 0000 L/A-24/3822000000-00000000000000000000000000000	Text	T Current value	New value None	Units Information	
	Signal 2 Signal 3 Signal 4	None None None	None None		
	 Signal 5 Signal 6 	# None # None	None		
	- ▼ Signal 7 - ▼ Signal 8	# None # None	None None		
Binger inputs unputs Binger Transducers Binger Big Inputs Binger Big Inputs	Signal 9 Signal 10 Signal 11	# None # None	None		
다. "블= Outputs 다. "블= Slot A	Signal 11 Signal 12 Signal 13	# None # None	None		
	Signal 14 Signal 15	# None # None	None		
⊕ =	L Signal 16	None	None		
B → "a uter B → "a System Inpedances B → "a Foult Locator B → "a Protection B → "a Unarce Internate B → "a Unarce Internate B → "a Unarce Supervision					
BEs Close Onto Fault Es Dese Onto Fault 				TD 🔲 RD 🗾 Id	ogs⊽ 🗙 🗩 🖾 01/28/2021 09:02:21 //

Figure 21

Click on the option *"None"*, highlighted in the previous figure, and make the following adjustment.

🔳 Signal 1		×
Signals		
Overcurrent Scheme P Overcurrent Scheme P Overcurrent Scheme W Overcurrent Scheme W Overexcitation Unit 1 T Overexcitation Unit 2 T Overexcitation Unit 3 T Overexcitation Unit 4 T	hase A Weak Infeed Trip hase B Weak Infeed Trip hase C Weak Infeed Trip /eak infeed Trip rip rip rip rip	^
Uverfrequency Unit 2 1 Overfrequency Unit 3 T Overfrequency Unit 3 T	np rip	
OverVoltage of Voltage	Transd.	~
Signals groups	🗖 All signals	
Trip protection outputs		-
<٠	OK →	Cancel

Figure 22

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Send the settings to the relay.

W ZIVercomPlus-2.13.3.0 db[3.47.3.0]					-		×
File View IEDs Configuration Help							5
X	🔳 🗗 📑 Group 1	🔹 🛛 Group 1 active 🛛 🐴 🕒	🖬 🚔 🎒 👘tings\In	puts Outputs LEDs\Outputs\Slot A\Digital C	Dutput 1\Lo	gic OR s	ignals
S/S Example Image: S/S Example S/S Example Image: S/S Example S/S Example S/S Example Image: S/S Example S/S Exampl	Text Signal 1 Signal 2 Signal 3 Signal 4 Signal 5 Signal 5 Signal 6 Signal 7 Signal 8 Signal 9 Signal 10 Signal 10 Signal 12 Signal 16 Signal 16	IT Current value IT Current value IT None None None INON INONE	Arrow value Overfrequency Unit 1 Trip None None	Units Information			
	1			TD 🔲 RD 📄 logs 🗸 🔆 🖇	• 1/28/	2021 09:0	6:24



On the second output, configure the trip signal of the 81o-2 unit.



👪 ZlVercomPlus-2.13.3.0 db[3.47.3.0]												- 0	×
File View IEDs Configuration Help													S
×		∎t	Group 1	- Group	l acti	ve 🔁 🛎 🗈		tings\Inp	uts O	outputs LEDs\Outputs\Slot A\Digita	l Output	2\Logic	OR signals
S/S Example Subset of the second se	Text • •	iignal iignal iignal iignal iignal iignal iignal iignal iignal iignal iignal	1 2 3 4 4 5 6 6 7 7 8 9 9 9 9 9 10 11 12 13 11 12 13 14 15 16			Current value None None	New value Overfrequency Uni None None None None None None None None	it 2 Trip	Units	Information			
<u>ک</u>										TD 🔲 RD 🔲 logs 🗸 🐳	\$)1/28/202	1 09:15:50

Figure 24

On the third output, configure the trip signal of the 81u-1 unit.



W ZIVercomPlus-2.13.3.0 db[3.47.3.0]		– 🗆 X
File View IEDs Configuration Help		8
	📳 🗗 🕈 Group 1 🔄 Group 1 active 🔹 🗟 🗈 🖓 🖬 🚱 🍎 🛄tings\Inputs Outputs LEDs\Outputs\Slot A\Digital (Output 3\Logic OR signals
🖃 🛄 S/S Example 🔒 🔨 🔨	Text IT Current value New value Units Information	
⊟ ☐- 000-DLFA-2A2473BZ000000XDX0-2010551	- 🐨 Signal 1 🕴 None Underfrequency Unit 1 Trip	
© Configuration	- 🐨 Signal 2 🏺 None None	
E Settings	- 🛡 Signal 3 🎁 None None	
	- 🗹 Signal 4 🍍 None None	
	- 🗹 Signal 5 🏓 None None	
Synchronization	- 🗹 Signal 6 🍍 None None	
	- 🗹 Signal 7 🍍 None None	
General	- 🗹 Signal 8 🗮 None None	
	- 🔽 Signal 9 🍍 None None	
🗄 📲 Inputs	- 🗹 Signal 10 🍍 None None	
🕀 📲 Virtual Digital Inputs	- 🗹 Signal 11 🌷 None None	
	- Signal 12 [#] None None	
📋 📲 Digital Output 1	- 🗹 Signal 13 🍍 None None	
Logic OR signals	- 🗹 Signal 14 炎 None None	
⊡*⊑= Digital Output 2	- 🗹 Signal 15 🌷 None None	
Digital Output 3	Signal 16 = None None	
⊞*ta= Digital Output 4		
⊞		
🗄 📲 📲 Digital Output 7		
⊞— ª∰ ∎ Slot B		
Fault Locator		
E		
🕀 📲 Distance Units		
I : : IH"E# Llose Unto Fault		1.00
		2 1/28/2021 09:38:04

Figure 25

On the fourth output, configure the trip signal of the 81u-2 unit.



ZIVercomPlus-2.13.3.0 db[3.47.3.0]									-		×
File View IEDs Configuration Help											S
	1	₽•	Group 1 💽 Group 1 a	ctiv	e 🔁 🗎 🗈	🖬 🚔 🚭 📄tings\Ing	outs O	utputs LEDs\Outputs\Slot A\Digital Outpu	t 4\Log	ic OR s	ignals
🖃 💼 S/S Example 🔒 🔥 🔥	Text			1T	Current value	New value	Units	Information			
☐ ☐ 000-DLFA-2A2473BZ000000XDX0-2010551	- 👻 Si	gnal 1		#	None	Underfrequency Unit 2 Trip					
Configuration	- 👻 Si	gnal 2	2	#	None	None					
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	🗌 — 🔄 Signal 4			#	None	None					
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Figure 26

4. Application Manager

Open the "Conprove Test Center (CTC)" software, shown in the figure below.



Figure 27

4.1. Ramp software adjustments

Open the Ramp software within the Conprove Test Center (CTC) software area, as shown in the figure below.





Figure 28

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. Fill in the "General Inform." with details of the tested device, installation location and the person responsible. This facilitates the preparation of the report, and this tab will be the first to be shown.



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Figure 29

Also in the *"Settings"* area, there are other useful tabs for the user. In the figure below, within the *"System"* tab, the values of frequency, phase sequence, primary and secondary voltages, primary and secondary currents, VTs and CTs transformation ratios are configured. There are two sub-tabs *"Impedance"* and *"Source"*, whose data are not relevant for this test.







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 also create a schematic of the connections between the test set and the tested equipment.

5. Channel Direction and Hardware Configurations

Click on the icon illustrated below.

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Figure 31

Then click on the highlighted icon to configure the hardware.





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Choose the channel configuration; adjust the auxiliary source and the method of stopping the binary inputs to finish click on *"OK".*

Settings	
Master Slave 1 Slave 2	Main Sampled Value Others
Model CE-6710 Serial Number 03010187CCM33222211U5HVRGLGLGL2Z0RXO Analog Outputs: Standard - Voltages: 4 × 300 V; 100 VA 2 x 600 V; 180 VA 2 x 600 V; 180 VA 1 x 600 V; 350 VA 1 x 300 V; 250 VA	Binary Outputs: Auxiliar Source: Initial State Initial State B01: NO B02: NO B02: NO B05 and B06 type: - 20 V Conventional B05: B06: NO O IRIG (B05) /Clock (B06) Transistor TTL
Customized Assoc.	Binary / Analog Inputs:
Standard - Currents:	BI1: BI - Contact
• 6 x 32 A; 210 VA	BI2: BI - Contact
	BI4: BI - Contact
	BI5: BI - Contact 👻
	BI6: BI - Contact 💌
	BI7: BI - Contact
	BI8: BI - Contact
15 C - N5	BIS: BI - Contact
	BI11: BI - Contact
	BI12: BI - Contact 👻
0 1x 50 A; 700 VA	Considers absolute values to Voltage-Bl AI 1-6 : 2V: 20V: 600V AI 7-12 : 200mV: 2V: 600
Customized Assoc. Connect CTs Range 1,25 A	<u>Q</u> K <u>C</u> ancel

Figure 33

On the next screen choose "Basic" and on the next window (not shown) choose "YES", finally click on "Confirm".

Char	nels Direct.							×
Local	Model	Reset for Hard.	hard Cat	O Basic			Confirm	
s.	CE-6710 ~	Connected	Jei	Advanced	COOSE.		Cancel	
ote	Serial Number:				50			
E U	03010187CCM3322	2211U5HVRGLGLGL	.2Z0RXO 🗸	🔽 ON Line	⁵o S. Value	Import	wood	
Ľ						import	Apon	



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6. Restore Layout

Due to the great flexibility that the software presents, allowing the user to choose the windows that will be presented and their positions, the command is used to restore the default settings. Click on the *"Layout"* button and then on *"Recreate Charts"* repeat the process by clicking on *"Layout"* and on *"Restore Layout"*. During the test, irrelevant windows are excluded.



Figure 35

7. Test Structure for function 81

Click on the highlighted "Insert New" button until you create 4 test sequences.







7.1. Main Screen 81o-1

In the first sequence, configure a situation to check the overfrequency of the first element whose adjustment is at 61.0Hz and 2.0s. Instead of *"Seq 001"* write *"810-1"* and select the option *"NO01"*. Then click on the *"..."* button highlighted in the following figure.



Figure 37

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7.2. Screen for 81o-1 increment

On this screen, in the *"Ramp Type"* field, choose the *"Frequency"* option and then select the *"Pulsed"* option. For voltage values, either initial or reset, use the nominal voltage of 66.4V balanced three-phase ABC. For the initial frequency use 60.98Hz and for the final frequency 61.02Hz with a step of 5.0mHz. In the field *"Generation Time in each Incr."* the user must configure a time that is always longer than the actuation time. In this case, a time of 2.25 seconds was chosen. *"Reset Time"* has been set to 0.25 seconds.

Rano Type Orded Frequency Image: Noted Intel Value Image: Noted Noted Notes Channel Mod. Ang. Freq. Via AQ_V02 66.40 V Via AQ_V02 66.40 V Via AQ_V03 66.40 V Via AQ_V04 66.40 V Via AQ_V03 66.40 V Via AQ_V04 60.00 Hz Via AQ_V04 60.00 Hz Via AQ_V04 0.4 0.4 Via AQ_V05 0.4 0.4 0.60.00 Hz Via AQ_V04 0.4<	lamp					_											>	
Frequency Image: Channel Image: Cha	Ramp T	уре												Genera	tion Time in	Each Incr .:	2,25 s	
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Vb A0_V02 66.40 V -120.0° 60.38 Hz (0) VC 0.00 Hz 22.2 Hz[0] 13.00 22.7 Hz[0] 13.00 12.7 Hz[0] 14.00 10.00 14.00<	Va	AO_V01	66,40 V	0°	60,98 Hz	×	VD	01,02 HZ	5,00 mHz	2,22 mHZ/s	10,00	22,75 8	Va	AO_V01	66,40 V	0 °	60,00 Hz	
Vec AD_V03 66.40 V 120.0* 60.38 Hz} 60.00 Hz Ia AD_010 0.A 0* 60.00 Hz Ib AD_020 0.A 0* 60.00 Hz UD01 AD_020 0.A 0* 60.00 Hz UD02 ID03 0.A 0* 60.00 Hz UD03 AD_05 0.A 0* 60.00 Hz UD04 AO_05 0.A 0* 60.00 Hz UD04 AO_06 0.A 0* 60.00 Hz UD04 AO_06	Vb	AO_V02	66,40 V	-120,0 °	60,98 Hz		VC	61,02 Hz	5,00 mHz	2,22 mHZ/5	19,00	22,75 \$	Vb	AO_V02	66,40 V	-120,0 °	60,00 Hz	
ia A0_01 0.4 0.* 60.00 Hz 60.00 Hz 1001 1 </td <td>Vc</td> <td>AO_V03</td> <td>66,40 V</td> <td>120,0 °</td> <td>60,98 Hz</td> <td></td> <td>la</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Vc</td> <td>AO_V03</td> <td>66,40 V</td> <td>120,0 °</td> <td>60,00 Hz</td>	Vc	AO_V03	66,40 V	120,0 °	60,98 Hz		la						Vc	AO_V03	66,40 V	120,0 °	60,00 Hz	
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ie A0_003 0 A 0 * 60.00 Hz 0 0 * 60.00 Hz UD01 A0_004 0 A 0 * 60.00 Hz 0 0 * 60.00 Hz UD02 A0_005 0 A 0 * 60.00 Hz 0 0 * 60.00 Hz UD03 A0_005 0 A 0 * 60.00 Hz 0 0 * 60.00 Hz UD04 A0_006 0 A 0 * 60.00 Hz 0 0 * 60.00 Hz UD04 A0_006 0 A 0 * 60.00 Hz 0 * 60.00 Hz UD04 A0_006 0 A 0 * 60.00 Hz 0 * 60.00 Hz UD04 A0_006 0 A 0 * 60.00 Hz 0 * 60.00 Hz UD04 A0_006 0 A 0 * 60.00 Hz 0 * 60.00 Hz Smay Outputs GOOSE Outputs B001 Imater incr. Reset Imater incr. Reset B003 Imater incr. Reset Imater incr. Reset Time incr. B006 Imater incr. Reset Time incr. Reset Time incr. Reset Time incr. </td <td>lb</td> <td>AO_102</td> <td>0 A</td> <td>0°</td> <td>60,00 Hz</td> <td></td> <td>lc</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>lb</td> <td>AO_102</td> <td>0 A</td> <td>0°</td> <td>60,00 Hz</td>	lb	AO_102	0 A	0°	60,00 Hz		lc						lb	AO_102	0 A	0°	60,00 Hz	
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UD02 AO_104 0 A 0* 60.00 Hz UD03 AO_105 0 A 0* 60.00 Hz UD04 AO_106 0 A 0* 60.00 Hz Start GOOSE Outputs GOOSE Outputs Intel value Intel val	UD01	AO_V04	0 V	0°	60,00 Hz		UD02						UD01	AO_V04	0 V	0°	60,00 Hz	
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UDU4 AO_106 0 A 0 * 60.00 Hz anay Outputs GOOSE Outputs Channel Incr. Reset BO01 0 BO02 0 BO03 0 BO04 0 BO05 0 BO06 0 BO07 0 BO08 0 OK Cancel	UD03	AO_105	0 A	0°	60,00 Hz		UD04						UD03	AO_105	0 A	0 °	60,00 Hz	
Binary Outputs GOOSE Outputs Channel Incr. B001 Incr. B002 Image: Channel Incr. B003 Image: Channel Incr. B004 Image: Channel Incr. B005 Image: Channel Incr. B006 Image: Channel Incr. B007 Image: Channel Incr. B008 Image: Channel Incr. B006 Image: Channel Incr. B007 Image: Channel Incr. B008 Image: Channel Incr. Image: Channel Incr. Reset Image: Channel Incr. Reset Image: Channel Incr. Image: Channel Image: Channel Incr. Image: Channel Image: Channel Image: Channel Incr. Image: Channel Image: Channel Image: Chann	UD04	AO 106	0 A	0°	60.00 Hz								UD04	AO 106	0 A 0	0°	60,00 Hz	
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B006 Image: Constraint of the sector of t	BO	05										initial valu						
B007 Image: Standard Time Every Incr. B008 Image: Standard Time Every Incr.	BO	06											i ← → i Generatio	n Reset	Time			
B008 Incr. 0K Cancel	BO	07											Time Ever	y				
OK Cancel	BO	08											Incr.			_		
															ОК		<u>C</u> ancel	

Figure 38

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7.3. Main Screen 810-2

In the second sequence, configure a situation to check the overfrequency of the first element whose adjustment is at 62.0Hz and 1.0s. In place of *"Seq 002"* write *"81o-2"* then click on the *"..."* button highlighted in the figure below.



Figure 39

7.4. Screen for incrementing 810-2

On this screen, in the *"Ramp Type"* field, choose the *"Frequency"* option and then select the *"Pulsed"* option. For voltage values, either initial or reset, use the nominal voltage of 66.4V balanced three-phase ABC. For the initial frequency use 61.98Hz and for the final frequency 62.02Hz with a step of 5.0mHz. In the field *"Generation Time in each Incr."* the user must configure a time that is always longer than the actuation time. In this case, a time of 1.25 seconds was chosen. "Reset Time" has been set to 0.25 seconds.



amp					_											
Ramp Ty	уре			O Direct									Genera	tion Time in	Each Incr .:	1,25 s
Frequer	ncy		\sim	Pulsed											Reset Time:	250,0 ms
nitial Va	lues				Lim	nits and Ir	icreases					Reset				
Chann	els/ Defini	tion					Limit	Incr.	d/dt	N Steps	Time	Chann	els/Definit	ion	Direct	
Point	Channel	Mod.	Ang.	Freq.	V	Va	62,02 Hz	5,00 mHz	4,00 mHz/s	19,00	13,75 s	Point	Channel	Mod.	Ang.	Freq.
Va	AO_V01	66,40 V	0°	61,98 Hz	V	Vb	62,02 Hz	5,00 mHz	4,00 mHz/s	19,00	13,75 s	Va	AO_V01	66,40 V	0°	60,00 Hz
Vb	AO_V02	66,40 V	-120,0 °	61,98 Hz	V	Vc	62,02 Hz	5,00 mHz	4,00 mHz/s	19,00	13,75 s	Vb	AO_V02	66,40 V	-120,0 °	60,00 Hz
Vc	AO_V03	66,40 V	120,0 °	61,98 Hz		la						Vc	AO_V03	66,40 V	120,0 °	60,00 Hz
а	AO 101	0 A	0°	60,00 Hz		lb						la	AO 101	0 A	0°	60,00 Hz
lb	AO_102	0 A	0°	60,00 Hz		lc						lb	AO_102	0 A	0°	60,00 Hz
lc	AO 103	0 A	0°	60,00 Hz		UD01						Ic	AO 103	0 A	0°	60,00 Hz
UD01	AO V04	0 V	0°	60,00 Hz		UD02						UD01	AO V04	0 V	0°	60,00 Hz
UD02	AO 104	0 A	0 °	60.00 Hz		UD03						UD02	AO 104	0 A	0.	60.00 Hz
JD03	AO 105	0.4	0°	60.00 Hz		UD04						UD03	AO 105	0.A	0.0	60.00 Hz
UD04	AO 106	0.4	0.0	60.00 Hz								UD04	AO 106	0.4	0.0	60.00 Hz
Binary O	outputs					OSE Out	puts									
Chi		Incr.	Reset			Chann	el In	cr. Res	set					_		
	01												In a Fi	— Г	Tî 🗌	
BOI	02												incr.			
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BOI	04										Initial va	lue				
BOI	00													T	A.X .	
BO	00											Generatio Time Ever	n Reset V	lime		
BO	07											Incr.				
BO	00												1	011		
														()K		Cancel

Figure 40

7.5. Main Screen 81u-1

In the third sequence, configure a situation to check the underfrequency of the first element whose adjustment is at 59.0Hz and 2.0s. In place of *"Seq 003"* write *"81u-1"* then click on the *"..."* button highlighted in the figure below.







7.6. Screen for 81u-1 increment

On this screen, in the *"Ramp Type"* field, choose the *"Frequency"* option and then select the *"Pulsed"* option. For voltage values, either initial or reset, use the nominal voltage of 66.4V balanced three-phase ABC. For the initial frequency use 59.02Hz and for the final frequency 58.98Hz with a step of 5.0mHz. In the field *"Generation Time in each Incr."* the user must configure a time that is always longer than the actuation time. In this case, a time of 2.25 seconds was chosen. *"Reset Time"* has been set to 0.25 seconds.





Figure 42

7.7. Main Screen 81u-2

In the fourth sequence, configure a situation to check the underfrequency of the second element whose adjustment is at 58.0Hz and 1.0s. In place of *"Seq 004"* write *"81u-2"* then click on the *"..."* button highlighted in the figure below.







7.8. Screen for 81u-2 incrementation

On this screen, in the *"Ramp Type"* field, choose the *"Frequency"* option and then select the *"Pulsed"* option. For voltage values, either initial or reset, use the nominal voltage of 66.4V balanced three-phase ABC. For the initial frequency use 58.02Hz and for the final frequency 57.98Hz with a step of 5.0mHz. In the field *"Generation Time in each Incr."* the user must configure a time that is always longer than the actuation time. In this case, a time of 1.25 seconds was chosen. *"Reset Time"* has been set to 0.25 seconds.







7.9. Pick-ups assessments

By clicking on the *"Ramp"* field, as shown in the next figure, 4 pick-up evaluations can be configured as follows.







Instead of *"Eval.1"* write *"81o-1"*, in Ramp select *"81o-1 > NO01"* for *"Condition"* set *"BI01 (↑)"*, for *"Type"* choose *"Frequency"*, for *"Output"* adjust *"Va"*, in the *"Nom. Value"* field set 61.00Hz and in the fields related to deviations set 10mHz.



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	Di	ec nnels	🚍 Hrd S 🔵 Sync 📢 Conr	Set Set nection	€ ⁶ 0 GOOSE Set. ⁵ v SV Set.	Insert New Delete	Copy 🐻 Sel. 🐻 All	3 I 3 I	Auto Ref Angle Va Separate Nodes/Bin	Reedit Test	Delete All	. •) Start	Stop	Ŭ N° Repetitions 0 ♀	Static Generation •	Settings Settings ↓ + +	Report	Units	Layout	
			Ha	rdware			Sequ	ence			Results				Generation		Options				
-	Ś	equen	ices			- ×	Wave	orm	Phasors Trajectorie	s Har	monics Synch	roscope	Plane Z]							▼ ×
ľ	~	004 Chan	81u-2	2 efinitio	n	13.75 s	NO01 - V	oltages V01	✓ AO_V02	V	AO_V03	🔽 AO	.V04								
	N001	Point Va Vb Vc Ia Ib Ic UD01 UD02 UD03 UD04	t Chan AO_V AO_V AO_V AO_IC AO_IC AO_IC AO_IC AO_IC AO_IC	inel 01 02 03 01 02 03 01 02 03 04 04 05 06	Definitions Frequency tincr 1.25 s; tRese		N001-C ▼ AO_	urrents 101	100.0 001 100.0 0 -100.0 0 0 0 2.00n 001 1/A 0 0	10.c	0] AO_103	20,00	2 104 2	30,00	003 40,00 1] AO_105 V AC	50,00)_106	004 60.00		70	t[s] .00	
1	Evalu	ations												_				_			ųΧ
•	scilog. Comp.	+ - 1 4	Time	Ramp	Name 810-1 810	Ramp 0-1 - NO01 BI01	Condition (†)	Fre	Type Ou equency ▼ Va	tput	Nom. Value 61,00 Hz	Dev 10,00 mH	2 10	lev. +),00 mHz	Real Value Total Devi 0 Hz 0	atior Status Hz					Calc.
	Eva En	luation	ns G	GOOSE	TimeStamp Repor	t															
ĺ	**	ON L	ine		New				Aux	Source	110,00 V Heat	ting:	0%								

Figure 46

Clicking on the "+" icon in the previous figure insert 3 more evaluations. The configuration must be done in a similar way to the first evaluation with changes in the binary and values of the pick-ups.

Eval	uatio	ns													
đ	+	a	-	а	Name	Ramp	Condition	Туре	Output	Nom. Value	Dev	Dev.+	Real Value	Total Deviation	Status
ပိ	-	E.	e ve	am	810-1	810-1 - NO01	BI01 (†)	Frequency -	Va	61,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 Hz	
6	Ŷ			~	810-2	81o-2 - NO01	BI02 (1)	Frequency 🔻	Va	62,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 Hz	
scilo	÷				81u-1	81u-1 - NO01	BI03 (1)	Frequency -	Va	59,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 Hz	
ő					81u-2	81u-2 - NO01	BI04 (↑)	Frequency -	Va	58,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 Hz	
Eva	aluatio	ons	GO	OSE .	TimeStamp R	eport									
47	ON	Line			New				Aux. Source 1	10,00 V Heat	ing: 0%				

Figure 47

7.10. Adjusting Graphics

Double-click on the *"Waveform"* option and maximize the screen to choose the relevant signals and insert markings for time analysis.



à Ar	l 🗋 🛙	<mark>ар</mark> Но	ad ∓ ome	Ran Dis	np 2.02.190 (64 splay Soft	4 Bits) - CE-6710 (ware Options	0301018	3)												-	٥	× ^ 🛛
L Ch	Direc annels	20 20 20 20 20 20 20 20 20 20 20 20 20 2	Hrd Set Sync Sel Connec Hardv	t tion ware	ඉිං GOOSE S ෙ SV Set.	et. Rev Rev	Insert C Delete ! Delete /	opy 🐻 🧟 Sel. 👘 🖉 All Sequer	Auto F Va Separa	ef Ang te Noo	e Re des/Bin	In Edition Construction C	. •	Start Stop	₫ Nº Repetitio Generat	ion	Static Seneration -	Settings	Report	Units	Layout	
/	Seque	ence	•				• ×	Wavefo	rm Phason	Tr	ajectories	Harmonics Synch	roscope	lane Z								• ×
^	004 Cha	nnel	81u-2 s/ Defi	nitic	'n	13,75 s		NO01 - Vol	ages 11 []	/] AO.	_V02	V AO_V03		/04								
	Poin Va Vb Vc Ia	nt (// //	Channe AO_V01 AO_V02 AO_V03 AO_I01	4	Definitions Frequency tlncr 1,25 s; ti	Reset 250,0 ms			100,1 1 -100,1	001			002		003			004				
N001	Ib Ic UD0 UD0	01 A 02 A	AO_102 AO_103 AO_V04 AO_104					N001 - Cur	ents	0 7 AO.	_102	10.00	20,00	30,00 04 🔽	4] AO_105	0,00	50,00	60.00		7(t [s]	
	UDO	04 /	AO_106					- + ++ + +	ŧ 0	0			l	J		.1	I				J	8
Eva	luation	ns	_	-	_			_		_	_		_			_	_					Ψ×
₫	+			_	Name	Ramo		ondition	Туле	_	Outert	Nom Value	Dev -	Dev +	Real Value	Total Deviati	or Status					
Coll	-	me	level	di i	810-1	810-1 - NO01	BI01	(†)	Frequency	•	Va	61,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 H	z	_				-Se
-	Ŷ	IF.	٦	R.	810-2	810-2 - NO01	BI02	(†)	Frequency	•	Va	62,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 H	z					0
scio	+				81u-1	81u-1 - NO01	BI03	(†)	Frequency	•	Va	69,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 H	z					
ő					81u-2	81u-2 - NO01	BI04	(†)	Frequency	•	Va	58,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 H	z					
E	valuatio	ons st	GOI	OSE .	TimeStamp Re	eport					Aux, Sou	ce 110.00 V Hea	tina: 0'	36								

Figure 48

Deselect the channel "AO_V04" and right-click on the voltage graph and choose the highlighted option.



Figure 49

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Select the current channels graph and click on the *"Delete"* key. Repeat the procedure for the DC analog outputs and binary outputs graphs.

aveform										- 0
NO01 - Voltages	☑ AO_V02 62.00 [f1tz] 60.00	☑ AO_V03	A0_V04	002	30.00	003	50.0		004	t[s]
Binary Inputs										
 BI01 BI11 	BI02	BI03	☑ BI04	BI05	BI06	BI07	BI08	BI09	BI10	
	N DH2									
BI01					l				l	l
BI02		l								
DIUS										
PIOF										
BIOG										
BI07										·····
BIOS		 T								
BI09										
BI10		1					1			
BI11		1			1		1			
BI12										
	0									
	4									



Right-click in the voltage channels window and increase the height of the graphs. The next step is to select only the binaries *"BI01", "BI02", "BI03"* and *"BI04".*







7.11. Time analysis

To evaluate the time, the value of the frequency where the last increment or decrement of each sequence occurs must be marked. To find these values, cursors are used. If necessary, a zoom can be performed to verify the moment of time where the marking must be carried out. To do this, left-click and drag the desired region. To remove the zoom, just double-click on the graph. The following figure shows the time for the first two elements.





Figure 52

According to the previous figure, it can be concluded that the time required for the first marking is 20.25 seconds and for the second, 35.00 seconds. The next figure shows the position of the last two elements.





Figure 53

According to the previous figure, it can be concluded that the time for the third marking is 56.75 seconds and for the fourth one, 71.50 seconds.

7.12. Inserting markup

To insert the markup right-click on the graphic and choose the following option.





Figure 54

Adjust the first time and repeat the procedure for the other markings.

Add M	larking			×
	Time:	20,25 s		
	Descr:	Mark01		
		🗹 Visible		
	(ок	Cancel	

Figure 55





Figure 56



Figure 57

Add	Marking	×
	Time: 71,50 s	
	Descr: Mark 04	
	🗹 Visible	
	ОК	Cancel



The markings are shown in the following figure. To return this window to the initial position, double click on the top bar (highlighted in green).







7.13. Time Ratings

By clicking on the *"Time"* field, as shown in the next figure, four operation time evaluations can be configured as follows.





Figure 60

Change the name "Eval. 1" to "81o-1", in the "Ignore Before" option choose "Tagging> Mark01", in the "Start" option choose "Tagging > Mark01" in the "End" option choose "Binary Input > BI01 (\uparrow)". In nominal time, set 2.0s with deviations of 150ms. The figure below shows these settings.

Eva	luatio	ns										
đ	÷		Name	Ignore Before	Start	End	Tnominal	Tdev-	Tdev+	Treal	Tdev	Status
ŏ	-	<u>.</u>	810-1	#Mark01	#Mark01	BI01 (†)	2,00 s	150,0 ms	150,0 ms	0 s	0 s	
	Ŷ											
scilo	+											
Ő												
Ev	 aluat	ions	GOOSE TI	meStamp Report								
_					1							
	rror L	.ist	Protection	Status								
+,	0	Lin	2	New			1	Aux. Source 110),00 V Heat	ing: 0%		

Figure 61

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By clicking on the "+" icon, three more evaluations are added and their adjustments are made in a similar way to the first evaluation.

Evalu	atio	ns										
Ê	+	a	Name	Ignore Before	Start	End	Tnominal	Tdev-	Tdev+	Treal	Tdev	Status
ວັ	-	<u>i</u>	810-1	#Mark01	#Mark01	BI01 (†)	2,00 s	150,0 ms	150,0 ms	0 s	0 s	
÷	Ŷ		810-2	#Mark02	#Mark02	BI02 (↑)	1,00 s	150,0 ms	150,0 ms	0 s	0 s	
scilo	+		81u-1	#Mark03	#Mark03	BI03 (1)	2,00 s	150,0 ms	150,0 ms	0 s	0 s	
ő			81u-2	#Mark04	#Mark04	BI04 (↑)	1,00 s	150,0 ms	150,0 ms	0 s	0 s	
Eva	luatio	ons	GOOSE Ti	meStamp Report								
En	ror Li	st	Protection	Status								
* ;	ON	Line		New				Aux. Source 11	0,00 V Heat	ting: 0%		

Figure 62

Use the command "A/t + G" to start the generation. The next figure shows the result with the pickup values found.



Figure 63

The following figure shows the operating times.

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Figure 64

8. Report

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

General Data of Test General Data of Tested Devi Local of Installation Reference Values Hardware Settings Distance Protection Settings Synchronism Protection Setting Sequences Test Results Notes and Observations Explanatory Figures Oneck List Commedions	ce		
	OK	Cancel	

Figure 65

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The figure below shows the beginning of a report. It is worth mentioning that within the Conprove Test Center (CTC) there is a tool called *"Preferences"*, which allows the user to insert a figure to fill the report header image with the company logo, for example. Furthermore, as the following figure highlights, it is possible to convert the report to .pdf and .rtf, therefore, the latter format allows editing through Microsoft Office Word, although the characteristics that make the report a fully produced document are lost by Conprove software.



Figure 66



9. Appendix A - Manufacturer Tolerances

Overfrequency Elements Pickup and reset

Underfrequency Elements Pickup and reset

Time Measurement Fixed Time ±0.01 Hz of the theoretical value

±0.01 Hz of the theoretical value

±1% of the setting or ±25 ms (the greater)

Note: The total trip time is equal to the adjusted fixed time plus the time defined in "*Activation Half-time*" (see Frequency Units).

Figure 67



10. Appendix B - Terminal Diagram

Analog Channels DLF-A

Magnitude	Analog Channels	Analog Channels description	SLOT (1/2 rack)	PINS
PHASE AG VOLTAGE	VA	VOLTAGE INPUT 1	D	1-2
PHASE BG VOLTAGE	VB	VOLTAGE INPUT 2	D	3-4
PHASE CG VOLTAGE	VC	VOLTAGE INPUT 3	D	5-6
SYNCHRONISM VOLTAGE	VSYNC	VOLTAGE INPUT 4	D	7-8
NEUTRAL VOLTAGE	VG	VOLTAGE INPUT 5	D	9-10
PHASE A CURRENT	IA	CURRENT INPUT 1	D	11-12
PHASE B CURRENT	IB	CURRENT INPUT 2	D	13-14
PHASE C CURRENT	IC	CURRENT INPUT 3	D	15-16
PARALLEL LINE NEUTRAL CURRENT	IPAR	CURRENT INPUT 4	D	17-18
GROUNDING CURRENT	IG	CURRENT INPUT 5	D	19-20

Figure 68





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11. Appendix C - Parameter Equivalence between Relay and Software

Ramp Software		ZIV DLF RELAY	
Parameter	Figure	Parameters	Figure
Pickups			
810-1	47	Overfrequency Pickup	17
810-2	47	Overfrequency Pickup	18
81u-1	47	Underfrequency Pickup	19
81u-2	47	Underfrequency Pickup	20
Times			
810-1	62	Overfrequency Delay	17
810-2	62	Overfrequency Delay	18
81u-1	62	Underfrequency Delay	19
81u-2	62	Underfrequency Delay	20

Table 2