

# INSTRUMENTOS PARA TESTES ELÉTRICOS Test Tutorial

Equipment Type: Protection Relay

Brand: Siemens

Model: <u>7SA6</u>

Function: <u>81u or PTUF – Underfrequency & 81o or PTOF –</u> <u>Overfrequency</u>

**Tool Used:** <u>CE-6003, CE-6006, CE-6707, CE-6710, CE-7012 or</u> <u>CE-7024</u>

**Objective:** <u>Testing the pickup and operating time of the</u> <u>underfrequency and overfrequency elements using the Ramp</u> <u>software.</u>

# Version Control:

Version	Descriptions	Date	Author	Reviewer
1.0	Initial Version	09/09/2022	M.R.C.	G.C.D.P.



Sun	nmary
1.	Relay Connection to CE-6710
1.1	Auxiliary Source
1.2	Voltage Coils
1.3	Binary Inputs6
2.	Communication with the 7SA6 relay
3.	Parameterization of relay 7SA67
3.1	Device Configuration7
3.2	Masking I/O8
3.3	Power System Data 19
3.4	Transformers10
3.5	Power System10
3.6	Breaker11
3.7	Setting Group A11
3.8	81 Over/Under Frequency Prot12
4.	Ramp software adjustments
4.1	Opening the Ramp
4.2	Configuring the Settings15
4.3	<i>System</i> 15
5.	Channel Direction and Hardware Configurations16
6.	Restore Layout
7.	Test structure for function 8119
7.1	Main Screen 81-1
7.2	Screen for incrementing 81-120
7.3	Main screen 81-221
7.4	Screen for increment 81-2
7.5	Main Screen 81-3
7.6	Screen for incrementing 81-324
7.7	Main screen 81-4
7.8	Screen for incrementing 81-4
7.9	Evaluation of pick-ups27
7.10	) Adjusting graphics
7.11	Time analysis
7.12	2 Inserting marking



7.13 <i>Time evaluation</i>	34
8. Report	37
APPENDIX A	38
A.1 Terminal Designations	38
A.2 Technical data	39



# Statement of responsibility

The information contained in this tutorial is constantly verified. However, differences in description cannot be completely excluded; in this way, CONPROVE disclaims any responsibility for errors or omissions contained in the information transmitted.

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.



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 under test and also be aware of safety standards and regulations.

# Copyright

Copyright © CONPROVE. All rights reserved. The dissemination, total or partial reproduction of its content is not authorized, unless expressly permitted. Violations are punishable by law.



# INSTRUMENTOS PARA TESTES ELÉTRICOS Sequence for testing the 7SA86 relay in the Ramp software

# 1. Relay Connection to CE-6710

Appendix A-1 shows the relay terminal designations.

# **1.1** Auxiliary Source

Connect the positive (red terminal) of the Auxiliary Source to pin F1 ( $U_{H}$ +) of the relay and the negative (black terminal) of the Auxiliary Source to pin F2 ( $U_{H}$ -).



# **1.2** Voltage Coils

To establish the connection of the voltage coils, connect the voltage channels V1, V2 and V3 to the relay pins R15, R17 and R18 respectively, connecting the three common ones to the R16 pin.





# **1.3** Binary Inputs

Connect the binary inputs of the CE-6710 to the binary outputs of the relay:

- BI1 to pin R1 and its common to pin R5.
- BI2 to pin R2 and its common to pin R5.
- BI3 to pin R3 and its common to pin R5.
- BI4 to pin R4 and its common to pin R5.



Figure 3

# 2. Communication with the 7SA6 relay

First, open "*DIGSI*" and connect an Ethernet (or serial) cable from the notebook to the relay. Then double click on the software icon.



When opening the program, select the substation that contains the relay in question (7SA6). After selecting the relay, right-click and select the "*Open Object*" option and then select the connection mode, as shown in the following figures.



🛃 DIGSI Manager - [Car	valho C:\Siemens\Digs	4\D4PROJ\Carvalho]		
🛃 Eile Edit Insert Devic	ce ⊻iew Options <u>W</u> indow	Help		
	∎ 🚰 📰 🚹 < No	Filter > 🗾 🔽		
🖃 🎒 Carvalho	7SA611 V4.6	🏮 7SJ612 V4.6 🛛 🏮 7U	M623 V4.6 🛛 🏮 7UT 61	3 V4.6 🏫 IEC61850 station
		Figure 5		
	Open device			×
	Connection type	Connection properties		
	C Offline	No settings required for this cor	nection type.	
	C Direct			
	C USB			
	Modem connection			
	C PROFIBUS FMS			
	<ul> <li>Ethernet</li> </ul>			
				_

Figure 6

#### 3. Parameterization of relay 7SA6

ОK

#### **3.1** Device Configuration

After the connection has been established, access the relay's general settings by double-clicking the left button on *"Settings"* repeat the operation for *"Device Configuration"*.

Cancel

Help



Rua Visconde de Ouro Preto, 77 - Bairro Custódio Pereira - Uberlândia – MG - CEP 38405-202. Phone (34) 3218-6800 Fax (34) 3218-6810 Home Page: www.conprove.com - E-mail: conprove@conprove.com.br



On the "Functional Scope" screen, disable all functions leaving only the "81 Over/Underfrequency Protection" function enabled. This prevents trips from other functions from interfering with the test. After the adjustments click "OK".

NO.	Function	Scope	1
0103	Setting Group Change Option	Disabled 💌	1
0110	Trip mode	1-/3pole	
0114	21 Distance protection pickup program	Disabled	
0120	68 Power Swing detection	Disabled	
0121	85-21 Pilot Protection for Distance prot	Disabled	
0122	DTT Direct Transfer Trip	Disabled	
0124	50HS Instantaneous SOTF	Disabled	
0125	Weak Infeed (Trip and/or Echo)	Disabled	
0126	50(N)/51(N) Backup OverCurrent	Disabled	
0131	50N/51N Ground OverCurrent	Disabled	
0132	85-67N Pilot Protection Gnd. OverCurrent	Disabled	
0133	79 Auto-Reclose Function	Disabled	
0134	Auto-Reclose control mode	with Trip but without Action time	-
0135	25 Synchronism and Voltage Check	Disabled	
0136	81 Over/Underfrequency Protection	Enabled	
0137	27, 59 Under/Overvoltage Protection	Disabled	
0138	Fault Locator	Disabled	1

Figure 8

# 3.2 Masking I/O

The next step is to adjust the relay output. To access these parameters, double-click the left button on *"Masking I/O (Configuration Matrix)"* as shown in the next figure.



🎉 DIGSI - [Carvalho / Folder / 7	SA611 V4.6/7SA611 V04.63.04]							
File Edit Insert Device View	Options Window Help							
🖬 🍯 🕹 🖻 🗗 🖆 🏂	蓬 🐉 🐁 🏤 🏢 🛄 📢							
🖃 🏮 Online	Select function							
🗄 📌 Settings	Device Configuration							
🗄 🚇 Annunciation	Masking I/O (Configuration Matrix)							
	I R CFC							
	Power System Data 1							
Control	Setting Group A							
√ lest	Scillographic Fault Records							
	General Device Settings							
	Time Synchronization							
	📝 Interfaces							
	Passwords							
	abcLanguage							

Figure 9

Binary outputs BO1, BO2, BO3 and BO4 are assigned to send trips of functions 81-1, 81-2, 81-3 and 81-4 respectively. In order to assist the test, LEDs 1, 2, 3 and 4 are used to signal the sending of TRIP.

A 🖓			яр																						
and the second s	6 6 🎄 🤋	🗄 暮 🕈 🛛 Indication	ns and commands only 🗾 No filter								•		1 0	0(	)Q	<b>?</b>									
		16-	Information		So	ource									0	) estina	ation								
	Number	Display text	Long text	Туре	BI	FS	C			BO							LED	\$			B	uffer	S :	× c	Ch
					01		1	2 3	4 5	5 6 7	7 8	9 10 1	1 12	1 2	3 4	5 6	7	8 9 1	10 11	12 13	14 0	S T			
) evice, General						×	•			1. 14	14	. <u></u> .	2.		4 4	4 14	14 14				×		×	×	
System Data 1																									
Dsc. Fault Rec.																					×		×		
P.System Data 2																					×	×	×	×	
leasurem.Superv																					×				
	05203	>BLOCK 810/U	>BLOCK 810/U	SP			4	1	200							-	1				10				
	05206	>BLOCK 81-1	>BLOCK 81-1	SFSingle	point	indicat	ion	3 3	3 3	3 3	3	3 3	3	8	8 8	3 3	3 3	3 3	8	3 3 1	10	3	X		
	05207	>BLOCK 81-2	>BLOCK 81-2	SP				0 0	0.0	0.0			100		0.0	0 0	0.0			0 0 0	10		X	2 2	
	05208	>BLOCK 81-3	>BLOCK 81-3	SP		-	-				-		-					-			10		X	_	
	05209	>BLOCK 81-4	>BLOCK 81-4	SP			-									_					10		X	-	
	05211	81 UFF	81 UFF	OUT				-													10			_	
	05212	81 BLOCKED	81 BLUCKED	OUT			-														10	10	X	_	
	05213	81 ACTIVE	81 ACTIVE	OUT																	10			_	
	05215	81 UnderV Blk	81 Undervoltage Block	OUT												1	1				10	10	X		
	05232	81-1 picked up	81-1 picked up	OUT				3 3	3 3	3 3	1	1 2 3	13	8	3 3	3 3	3 3			8 8		10	X	_	
81 0/U Freq.	05233	81-2 picked up	81-2 picked up	OUT				2.2	2 2	2.2	2	2 2 2	2		2 2	2.2	2.2			2 2 2	1 2 2	10	X	2:2	
	05234	81-3 picked up	81-3 picked up	001			-		-				-				-	-	-			IU	X	-	
	05235	81-4 picked up	81-4 picked up	OUT			-					_									_	10	X		
	05236	81-1 TRIP	81-1 TRIP	001			U		-		-	_	-	J	_	-	-			_	_		X		
	05237	81-2 TRIP	81-2 TRIP	OUT				U						U		1					_		X		
	05238	81-3 TRIP	81-3 TRIP	OUT				U							U	_					_		X	-	
	05239	81-4 TRIP	81-4 TRIP	OUT		· · ·	· ·	· ·	U		1	· · ·	- C		U	~ ~	· ·	· · ·		· · ·			X	-	
	05240	81-1 Time Out	81-1: Time Out	OUT				3 3	1	1 1	1	2 2 3	1		3 3	3 3	3			1		8		_	-
	05241	81-2 Time Out	81-2: Time Out	OUT				2	2 2	2 2	-			-	2 2	2 2	0 0			2 2 2	- 2 2	-		1 1	
	05242	81-3 Time Uut	81-3: Time Uut	001			-			-															
	05243	81-4 Time Out	81-4: Time Out	OUT			_							_						_	_		+		
N100-Modul 1				_			_					_				_				_		_	+	-	
Testing						-	_					_									*	_		_	
Entrl Authority						-						_				_					-			-	
Control Device				_		- î	`									_							Î.	^	î.
Process Data				_					13							8. 8.	0.0				*		++	*	-
Measurement				-			-		2.2												-		++	31.3	-
Set Points[MV]				_			-	-	-	-				-								-	++	-	
				_	+		_					_		_				_		_	_	_		-	
Energy																									
Energy Statistics	-						-				_		_	_					_		-				

#### **3.3** *Power System Data 1*

Double-click on "Power System Data 1" to access the system settings.



File Edit Insert Device View	Options Window Help
E ∰ X B C Y M S C I Online E Y Settings	Select function
<ul> <li>Image: Annunciation</li> <li>Image: Annunciation</li></ul>	Masking I/O (Configuration Matrix)     CFC     Power System Data 1     Setting Group A     General Device Settings     Time Synchronization     Interfaces     Passwords     abcLanguage
Г Т;	auno 11

Those adjustments highlighted in red need special attention so that if the adjustments are not made correctly the results may be inconsistent or even not work.

# **3.4** *Transformers*

In this tab, configure the nominal line voltage value on the secondary.

No.	Settings	Value			
0201	CT Starpoint	towards Line			
0203	Rated Primary Voltage	400,0 k			
0204	Rated Secondary Voltage (Ph-Ph)	115			
0205	CT Rated Primary Current	1000 -			
0206	CT Rated Secondary Current				
0210	V4 voltage transformer is	not connecte			
0211	Matching ratio Phase-VT To Open-Delta-VT	1,7			
0215	5 Matching ratio Vsy1 / Vsy2				
0220	14 current transformer is	Neutral Current (of the protected lin			
0221	Matching ratio I4/lph for CT's	1,00			
7 <u>D</u> isp	lay additional settings				

Figure 12

#### 3.5 Power System

In the "Power System" tab, configure the frequency and phase sequence.



Power Sy	stem Data 1	
Transform	ners Power System Breaker	
<u>S</u> ettings		
No.	Settings	Value
0207	System Starpoint is	Solid Grounded
0230	Rated Frequency	60 Hz
0235	Phase Sequence	ABC
0237	Setting format for zero seq.comp. format	Zero seq. comp. factors RG/RL and XG/XL
Disp	lay additional settings	
		Export Graph About
OK	Aplicar <u>D</u> IGSI -> Device	Cancelar Ajuda

Figure 13

# 3.6 Breaker

In this tab you can keep the default settings.

Power Sy	Power System Data 1					
Transform	ers Power System Breaker					
<u>S</u> ettings:						
No. Settings Value						
0240A	Minimum TRIP Command Duration				0,10 sec	
0241A	Maximum Close Command Duration				0,10 sec	
0242	Dead Time for CB test-autoreclosure				0,10 sec	
Disp	ay additional settings	Egport		iraph	About	
ОК	Aplicar DIGSI -> Device			Cancelar	Ajuda	

Figure 14

# 3.7 Setting Group A

In this option the sub and overfrequency functions are adjusted.



File       Edit       Insert       Device       View       Options       Window       Help         Image: Second Structure       Select function         Image: Second Structure       Image: Second Structure       Image: Second Structure       Select function       Image: Second Structure         Image: Second Structure       Image: Second Structure       Image: Second Structure       Image: Second Structure       Image: Second Structure         Image: Second Structure       Image: Second Structure       Image: Second Structure       Image: Second Structure       Image: Second Structure         Image: Second Structure       Image: Second Structure       Image: Second Structure       Image: Second Structure       Image: Second Structure         Image: Second Structure       Image: Second Structure       Image: Second Structure       Image: Second Structure       Image: Second Structure         Image: Second Structure       Image: Second Structure       Image: Second Structure       Image: Second Structure       Image: Second Structure         Image: Second Structure       Image: Second Structure       Image: Second Structure       Image: Second Structure         Image: Second Structure       Image: Second Structure       Image: Second Structure       Image: Second	🎸 DIGSI - Carvalho / Folder / 7SA611 V4.6/7SA611 V04.63.04					
<ul> <li>Carvalho / Folder / 7SA611 V4.6/7SA611 V04.63.04</li> <li>Online</li> <li>Select function</li> <li>Device Configuration</li> <li>Masking I/O (Configuration Matrix)</li> <li>CFC</li> <li>Control</li> <li>Control</li> <li>Test</li> </ul>	File Edit Insert Device Yiew Opt	ions Window Help				
Figure 15	Carvalho / Folder / 75A611	V4.6/7SA611 V04.63.04 Select function Device Configuration Masking I/O (Configuration Matrix) CFC Power System Data 1 Setting Group A Oscillographic Fault Records General Device Settings Time Synchronization Time Synchronization Time Synchronization Interfaces Passwords abcLanguage imme 15				

The "Power System 2" option settings are irrelevant for this test.

	Group A		
Eunction	ns:		
No.	Function		
0011	Power Syste Measuremer	em Data 2 nt Supervision	
0036	81 Over/Un	der Frequency Prot.	
Cus	tomize	Reset	About
Cus	tomize	<u>H</u> eset	<u>A</u> bout
Cus	tomize	<u>H</u> eset	<u>A</u> bout

Figure 16

# 3.8 81 Over/Under Frequency Prot.

In this field, the frequency pick-ups are set along with the timing.



No.	Settings	Value
3601	81 Over/Under Frequency Prot. element f1	ON: with Trip 💌
3603	81-1 Pickup	58,00 Hz
3604	81-1 Time Delay	2,00 sec
3611	81 Over/Under Frequency Prot. element f2	ON: with Trip
3613	81-2 Pickup	56,00 Hz
3614	81-2 Time Delay	1,00 sec
3621	81 Over/Under Frequency Prot. element f3	ON: with Trip
3623	81-3 Pickup	62,00 Hz
3624	81-3 Time delay	2,00 sec
3631	81 Over/Under Frequency Prot. element f4	ON: with Trip
3633	81-4 Pickup	64,00 Hz
3634	81-4 Time delay	1,00 sec
<u>D</u> isp	olay additional settings	north E Grande E About

Figure 17

Note: The highest of the 3 phase-to-phase voltages is used for frequency measurement. It must reach at least 65 % of the nominal voltage set in parameter 204, Rated Secondary Voltage (Ph-Ph). Below this value, frequency measurement does not occur.

#### 4. Ramp software adjustments

# 4.1 Opening the Ramp

Click on the "*CTC*" application manager icon.



Click on the "Ramp" software icon.



C	onprove Test Ce	enter	
CONPROVE	Version 2.02.191		
General General Tests	Secondary Secondary Tests	Measurement Applications for measurement	
Quick QUCC Aux Calibration	Differential	्र <b>्यः</b> Multimeter	
Primary Primary Tests	Meter Power Quality PSB OoS Ramp Harmonic Restraint Sequencer	Setup Equipment Set. / Tests Settings Dipdate Firmware Software Language	~
<ul> <li>€ CT</li> <li>☆ VT</li> <li>☆ Transformer</li> <li>Ω Resistance</li> <li>⊕ n PMaster</li> </ul>	Synchronism         Overcurrent         Transducer         Transient Playback         Vez         Volts/Hertz	Support Documentation and assistance U Tutorials Videos	
	Additional applications	Contact Forum User Manual Quick Guide Self-diagnosis 모급 Remote Access	* *

Figure 19



Figure 20

Rua Visconde de Ouro Preto, 77 - Bairro Custódio Pereira - Uberlândia – MG - CEP 38405-202.<br/>Phone (34) 3218-6800Phone (34) 3218-6800Fax (34) 3218-6810Home Page: www.conprove.comE-mail: conprove@conprove.com.br



# **4.2** Configuring the Settings

When opening the software, the "Settings" screen will open automatically (as long as the "Open Settings when Starting" option found in the "Software Options" menu is selected). Otherwise click directly on the "Settings" icon.



Inside the "Settings" screen, fill in the "General Inform." with data on the "Tested device", "Location" and the "Responsible". This facilitates the elaboration of the report and this tab will be the first page to be shown in the report.

gs	1
General	General Inform. System Notes & Obs. Explanatory Figures Check List Others Connections
Distance	Descr: Under and Overfrequency Date:
ynchronism	Tested device:
	Identif: 23031982 V Model 7SA611 V
	Type: Line Protection V Manufacturer: Siemens V
	Location:
	Substation: Conprove ~
	Bay: 1
	Address: Visconde de Ouro Preto 75, Custódio Pereira
	City: Uberlândia V State: MG V
	Responsible:
	Name: Michel Rockembach de Carvalho 🗸
	Sector: Engineering V Registry: 00001 V
	Tool Test:
	CE-6710 Series Num.: 09402227CCM03222011U5HVRG0000L2Z0RXD
fault 🗸	Import Export Preferences <u>Q</u> K <u>C</u> ance

Figure 22

# 4.3 System

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





Figure 23

There are other tabs where the user can insert "*Notes & Obs., Explanatory Figures*", can create a "*Check List*" of the procedures for carrying out tests and also create a schematic with all the connections between the test set and the test equipment.

# 5. Channel Direction and Hardware Configurations

Click on the icon illustrated below.



Figure 24

Then click on the highlighted icon to configure the hardware.





Choose channel configuration, adjust auxiliary source and stop method of binary inputs. Finally, click on "OK".



Rua Visconde de Ouro Preto, 77 - Bairro Custódio Pereira - Uberlândia – MG - CEP 38405-202. Phone (34) 3218-6800 Fax (34) 3218-6810 Home Page: www.conprove.com - E-mail: conprove@conprove.com.br



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

Cha	nnels Direct.							×
Local	Model	Reset for Hard. Connected	Set	Basic		[	Confirm	
tes	CE-6710 V				GOOSE		Cancel	
Remo	09402227CCM0322	2011U5HVRG0000L	2Z0RXD ~	🕑 ON Line	<sup>s</sup> <sub>v</sub> S. Value	Import	Export	

Figure 27

# 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, windows that are not relevant are excluded.



Following is the default structure after the previous commands.

🊵   🗋 😅 🛃 🥃   Ramp 2.02.191 (64 Bits) - CE-	-6710 (0940222)							- o ×	:
Arquivo Home Display Software Optic Channels Connection Hardware	Sequence Manager Copy Solution Manager Copy Solution Solution Sequence Manager Discourses Sequence Manager Discourses Sequence	Auto Ref Angle Va Separate Nodes/Bin e Trainstorier	Reedit Test Delete All Results	start Stop	N° Repetitions 0  Generation	Static Generation •	) Horis III. → + + + ps 6 + Report ptions	Units Layout	•
001         Seq001         0 s           v         N001         0 s	NO01 - Votages	] AO_V02	)_V03 ☑ AO_V04						<u> </u>
Analog. DC Output     Binary Outputs     GOOSE Outputs	4,00n 2,00n 0	VM.							
Time and Advancement	-2,00n -4,00n (	0 1.00	2.00 3.00	4.00	5.00 6.00	7.00	8.00 9.0	t[s] 0 10.00	
	NO01 - Currents  AO_I01  4.00n	] AO_102	0_103 ☑ AO_104	☑ AO_105	AO_106				
	2,00n *  +  ++  +  + = 0	 							8
Evaluations	4								×
Name     Ignore Before       Eval. 1     Eval. 1	Start End	Tnominal 1 0 s	Tdev⊷ Tdev≁ 0s 0s	Treal Tdev 0s 0s	Status 			Level Ramp Calc.	
Evaluations         GOOSE TimeStamp Report           Error List         Protection Status           Image: Status         Image: Status           Image: Status         Image: Status           Image: Status         Image: Status		Aux.	Source 110,00 V Heatin	g: 0%					
			Figure	29					

Rua Visconde de Ouro Preto, 77 - Bairro Custódio Pereira - Uberlândia – MG - CEP 38405-202.<br/>Phone (34) 3218-6800Phone (34) 3218-6800Fax (34) 3218-6810Home Page: www.conprove.comE-mail: conprove@conprove.com.br



# 7. Test structure for function 81

Click the button highlighted in red until you create 4 test sequences.

Arquivo Home Display Software Opti	-6710 (0940222)										- 0	×
First Sync Set Sync Set. Direc Channels t≩ Connection Underset	t Delete All		Auto Ref Angle Va Separate Nodes/Bi	n Reedit	Delete All	Start Stor	<b>O</b> N° Repetition	s 0 C Static Generation	Settings	Report U	nits Lay	Dut
Sequencer - X	Wayeform	equence	raiectories VHam	anice Syncl	Results	7	Generation	n	Options			- X
001         Seq001         0 s           V         N001         0 s	NO01 - Voltages		_V02	AO_V03	☑ AO_V04	- 1						
Analog. DC Output		4,00n ¥ [V]	J									
Binary Outputs     GOOSE Outputs		0										
Time and Advancement		-2,00n										
		-4,00n	1.00	2.00	3.00	4.00	5.00	6.00 7.00	8.00	9.00	t	[s] 10.00
	NO01 - Currents	A0, 4,00n 1.[A]. 2,00n	_102	AO_103	AO_104	☑ AO_105	AO_10	6				
	+  +  ++  +  + =	00										- 8
Evaluations	1											<del>.</del>
Image: state	Start	End	Tnominal 0 s	Tdev- 0 s	Tdev+ 1 0 s	os Tdev	Status 0 s				Level	Calc.
Evaluations GOOSE TimeStamp Report												
ON Line New			A	ux. Source 110,	00 V Heating:	0%						
				I	Figure 3	0						

Click on the option "NO01" highlighted in green and decrease the size of the right window for easier viewing.

# 7.1 Main Screen 81-1

In the first sequence, a situation is configured to verify the underfrequency of element 81 whose adjustment is at 58.0 Hertz and 2.0 seconds. In place of "Seq 001" write "81-1". Then click on the highlighted in red button in the figure below.



					INS	STRUMEN	ITOS PARA	A TESTES	S ELÉTR	ICOS					
à		🍟 🛃 🚽 🛛 Rai	mp 2.02.191 (64 Bit	s) - CE-6710 (09402)	22)								-	ð×	
An	quivo	Home D	isplay Softwar	e Options										^ (	2
E	5	🚍 Hrd Set	🎲 GOOSE Set.	🔊 🐻 insert	Copy 🐻 🛃 🗹	Auto Ref Angle	In Edition		ن 📰 🖌	N° Repetitions 0		📻 🎋 🛄	🔮 🕒		
	Direc	Sync Set	5 <sub>∪</sub> SV Set.	Insert 24	: Sel. '🐻 👼'	Va	Reedit Reedit	Sta	art Stop		Static	Settings	Report Units	Layout	
Ch	annels	Connection	1	New 😥 Delete	All	Separate Nodes/Bin	Test Delete All		•	Constant	Generation •		• •	•	
	Segue	mardwar	e		Waveform	Phasors Trajector	ies Harmonics / Svn	chroscone / Plan	.7	Generation		Options		- *	h
$\leq$	Joo1	01.1				riajector	its mannonics syn	enroscope   Plan	C2					^	4
	001	01-1			AO V01	AO V02	V AO V03	🔽 AO V04						I	
1^	Cha	nnels/ Definiti	on			Luna.									
	Poi	nt Channel	Definitions			4.00n - ¥ [¥]									
	Va	AO_V01	tincr 0.500 s			2.00n									
	Vc	AO_V03				-2.00p									
	la	AO_I01				-4 00n								tiat	
	lb	AO_102	_			0	1,00 2,00	3,00	4,00	5,00 6,0	0 7,00	8,00	9,00	10,00	
5		AO_103	-												
ğ	UDO	2 AO_104			AO I01	AO 102	V AO 103	🐼 AO 104	V AC	0.105	AO 106				
	UD0	03 AO_105		II.'		Les contractions									
	UDO	AO_106				4.00n 1 [A]									
						2,00n		1							
						0 0								=	2
		_			1	4								•	
Eva	aluation	15												<b>џ</b> >	c
슽	+	a) Name	Ignore Befor	e Start	End	Tnominal	Tdev- Tdev+	Treal	Tdev	Status					1
G	-	Eval. 1				0 s	0 s 0 s	0 s	0 s					amp	
cilog.	1 4														
Ē	valuatio	ons GOOSE	TimeStamp Repor	rt											1
	Error Lis	st Protectio	on Status												
4	ON	Line	New	•		Au	x. Source 110,00 V He	ating: 0%							
							Figur	e 31							

## 7.2 Screen for incrementing 81-1

On this screen, in the "Ramp Type" field, choose the "Frequency" option and then select the "Pulsed" option. For the voltage value, 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 2.3 seconds was chosen. "Reset *Time*" has been set to 0.3 second.





#### **7.3** *Main screen* 81-2

Figure 32

In the second sequence, configure a situation to verify the underfrequency of the 81-2 element whose adjustment is at 56.0 Hertz and 1.0 second. In place of "Seq 002" write "81-2" then click on the highlighted button in the figure below:



Arqu Dir Chan	ec nels	Home Display Hrd Set \$ Sync Set 5 Connection Hardware	Software GOOSE Set. SV Set.	e Options Insert New	rt Copy te Sel. te All Sequence	Auto Ref Angle Va Separate Nodes/Bir	Reedit Test Delete All Results	• Sta	rt Stop	び     № Repetitions     0       Generation	Static Generation -	Settings	Report U	Layout	^ (
<u>s</u>	equenc	:es		• >	Waveform	Phasors Trajecto	ories Harmonics Sync	hroscope Plane	Z						• ×
^	002 Chann	81-2 els/ Definition		0 s	NO01 - Voltages	✓ AO_V02	✓ AO_V03	✓ AO_V04							
	Point Va Vb Vc Ia Ib	Channel         Def           AO_V01         Mod           AO_V02         tince           AO_V03         AO_101           AO_102         AO_103	Finitions Jules r 0,500 s			100.0 VM 0 -100.0 0			10,00	)		21	0,00	t[s]	
NOOI	UD01 UD02 UD03 UD04	AO_V04 AO_I04 AO_I05 AO_I06			N001 - Currents	AO_102	✓ AO_103	☑ AO_104		AO_105	AO_106		-		
						0 0									
Evalu	ations														<b>4</b> ×
scilog. Comp.	+ + + Timo	Eval. 1	Ignore Before	e Start	End	Tnominal 0 s	Tdev- Tdev+ 0s 0s	Treal 0 s	Tdev 0 s	Status 5				Level	Calc.
Eval Err 47	or List ON Lir	GOOSE Time Protection Sta ne N	eStamp Report atus lew	t		A	ux. Source 110,00 V Hea	ting: 0%							

# 7.4 Screen for increment 81-2

On this screen, in the "*Ramp Type*" field, choose the "*Frequency*" option then select the "*Pulsed*" option. For the voltage value either initial or reset, use the rated voltage of 66.4V balanced three-phase ABC. For the initial frequency use 56.02Hz and for the final frequency 55.98Hz 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 1.3 seconds was chosen "*Reset Time*" has been set to 0.3 seconds.





# 7.5 Main Screen 81-3

Figure 34

In the third sequence, configure a situation to check the overfrequency of element 81-3 whose adjustment is at 62.0Hz and 2 seconds. In place of "Seq 003" write "81-3". Then click on the highlighted button in the figure below:



		IN	STRUMEN	TOS PARA	TESTES E	LETRICOS			
2 I	🗋 🚰 🥃 🚽 Ramp 2.02.191 (64 Bits)	) - CE-6710 (0940222)						-	
Cha	Huwo Home Display Software	Options Insert Copy Insert New 20 Delete Sel. Sequence Sequence	Auto Ref Angle Va Separate Nodes/Bin	Reedit Test	Start	Ŭ № Repetitions 0 🛟 Stop Generation	Static Generation - Settings & Multiple Settings & P	Report Units	Layout
$\square$	Sequences	▼ X Waveform	Phasors Trajectories	s Harmonics Synchro	oscope Plane Z				• ×
^	O03         81-3           Charnels/ Definition           Va         A0_V01           Modules           Vb         A0_V02           Vc         A0_V03           Ia         A0_I01	0 s N001 - Voltages	✓ AO_V02 100.0 0 -100.0	V AO_V03	☑ AO_V04		002		
N001	Ib         AO_J02           Ic         AO_J03           UD01         AO_V04           UD02         AO_J04           UD03         AO_J05           UD04         AO_J06	N001 - Currents ⊮ A0_01 +  +  +   +  + ≢	0 4.00n [001 1.[A] 0 0	10.1	00 AO_104	20,00	30,00 06		
Eva Dollar Eva	Iuations           Image: Description of the second	Start End	Tnominal T	dev- Tdev+ 0s	Treal Td 0 s	ev Status 0s			Level Ramp Calc. × ±
€ +7	Frror List Protection Status ON Line New		Aux.	Source 110,00 V Heatin	ng: 0%				
				Figure	35				

## 7.6 Screen for incrementing 81-3

On this screen, in the "*Ramp Type*" field, choose the "*Frequency*" option and then select the "*Pulsed*" option. For the voltage value either initial or reset, use the rated voltage of 66.4V balanced three-phase ABC. For the initial frequency use 61.98 Hz 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 2.3 seconds was chosen. "*Reset Time*" has been set to 0.3 seconds.





# 7.7 Main screen 81-4

Figure 36

In the fourth sequence, configure a situation to check the overfrequency of element 81-4 whose adjustment is at 64.0Hz and 1.0 second. In place of "Seq 004" write "81-4" then click on the highlighted button in the figure below:





# 7.8 Screen for incrementing 81-4

On this screen, in the "*Ramp Type*" field, choose the "*Frequency*" option then select the "*Pulsed*" option. For the voltage value, either initial or reset use the nominal voltage of 66.4V balanced three-phase ABC. For the initial frequency use 63.98 Hz and for the final frequency 64.02 Hz 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 1.3 seconds was chosen. "*Reset Time*" has been set to 0.3 seconds.





# 7.9 Evaluation of pick-ups

Clicking on the "Ramp" field, as shown in the next figure, you can configure 4 pickup evaluations as follows.



🚵   📋 📷 🚽   Ramp 2.02.191 (64 Bits) - CE-6710 (0161	1117)				- ð ×
Arquivo Home Display Software Options					~ 😮
Channels     Hrd Set     Sync Set     Sync Set     Channels     Connection     Hardware	rt Copy [ 🔅 🔊 🔽 Auto Ref Angle ete Sel. [ 🖉 🐻 🗌 🔽 Va 🗢 tet All Sequence	Redit Delete Test Test Delete All Results	Start Stop	Static Generation -	Report Units Layout
Sequences × X	Waveform Phasors Traiectorie	Harmonics / Synchroscope / Plan	ne Z	options	• X
Other         B1-4         14.70 s           Other         Channel         Definition           Point         Channel         Definitions           Va         AO_VO1         Frequency         Imm           Vb         AO_VO2         ther 1.30 s. tReset 300.0 ms         Imm           Ve         AO_U03         ther 1.30 s. tReset 300.0 ms         Imm           Ib         AO_U02         ther 1.30 s. tReset 300.0 ms         Imm           VD         AO_U03         ther 1.30 s. tReset 300.0 ms         Imm           VD         AO_U03         ther 1.30 s. tReset 300.0 ms         Imm           VD         AO_U03         ther 1.30 s. tReset 300.0 ms         ther 1.30 s. tReset 300.0 ms           VD         AO_U03         ther 1.30 s. tReset 300.0 ms         ther 1.30 s. tReset 300.0 ms         ther 1.30 s. tReset 300.0 ms           VD         AO_U04         ther 1.30 s. tReset 300.0 ms         ther 1.30 s. tReset 300.0 ms         ther 1.30 s. tReset 300.0 ms           VD         AO_U04         ther 1.30 s. tReset 300.0 ms         ther 1.30 s. tReset 300.0 ms         ther 1.30 s. tReset 300.0 ms           VD         AO_U04         ther 1.30 s. tReset 300.0 ms         ther 1.30 s. tReset 300.0 ms         ther 1.30 s. tReset 300.0 ms         ther 1.30 s. tReset 300.0 ms	N001 - Votages           Ø A0_V01           Ø A0_V01           Ø 001           Ø 001	✓         AD_V03         ✓         AO_V04           ✓         002         002           10.00         20.00           ✓         AO_104           ✓         AO_104           ✓         002	003 30,00 40,00 ♥ A0_105 ♥	AO_J06	04
Evaluations					Ψ×
🖞 🕂 👦 Name IgnoreBefore Start	End Tnominal	Tdev- Tdev+ Treal	Tdev Status		
Ŭ	0 s	0 s 0 s 0 s	0 s		Leve Ram
Evaluations GOOSE TimeStamp Report					
Error List Protection Status		a			
Set New	Au	x. Source 110,00 V   Heating: 0%			
		Figure 39			

Instead of "*Eval.1*" write "81-1\_pkp", in Ramp select "81-1 > NO01" for "*Condition*" set "BI01 ( $\uparrow$ )", for "*Type*" choose "*Frequency*", for "*Output*" set "Va", in the field "Nom Value" set 58.00Hz and in the fields related to deviations set 10mHz.

Eva	luatio	ns													
Ê	+	a	_	_	Name	Ramp	Condition	Туре	Output	Nom. Value	Dev	Dev.+	Real Value	Total Deviation	Status
ပိ	-	<u>.</u>	6 A B	am	81-1_pkp	81-1 - NO01	BI01 (†)	Frequency -	Va	58,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 Hz	
Oscilog.	Ŷ ↓			8											
Ev	aluati	ons	GO	OSE T	imeStamp R	eport									
E	rror L	ist	Prote	ection	n Status										
+,	ON	l Line			New				Aux. Source 1	10,00 V Heatin	ng: 0%				
								17	• 40						

Figure 40

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

Eval	luatio	ns													
Ê	+	a	-	•	Name	Ramp	Condition	Туре	Output	Nom. Value	Dev	Dev.+	Real Value	Total Deviation	Status
ő	-	<u>اق</u>	6V6	am	81-1_pkp	81-1 - NO01	BI01 (↑)	Frequency -	Va	58,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 Hz	
6	Ŷ			~	81-2_pkp	81-2 - NO01	BI02 (↑)	Frequency -	Va	56,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 Hz	
scilo	+				81-3_pkp	81-3 - NO01	BI03 (↑)	Frequency -	Va	62,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 Hz	
Ő					81-4_pkp	81-4 - NO01	BI04 (↑)	Frequency -	Va	64,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 Hz	
Ev	aluati	ons	GO	OSE .	TimeStamp R	eport									
E	rror L	ist	Prot	ectio	n Status										
47	ON	l Line			New				Aux. Source 1	10,00 V Heat	ting: 0%				
								T	Sama 11						





# 7.10 Adjusting graphics

Double click on the "Waveform" option of the right window and maximize the screen to choose the relevant signals and insert time analysis markings.



Figure 42



Right click on the voltage graph and choose the highlighted option.

Figure 43

Rua Visconde de Ouro Preto, 77 - Bairro Custódio Pereira - Uberlândia – MG - CEP 38405-202.<br/>Phone (34) 3218-6800Phone (34) 3218-6800Fax (34) 3218-6810Home Page: www.conprove.com-E-mail: conprove@conprove.com.br



Select the current graph and click on the "*Delete*" key repeat the procedure for the DC analog outputs and binary output graph. Uncheck the option "*V04*".

✓ AO. 001 64,00 fHz 60,00 56,00 0	V02 ♥ A0_v ] 10.0	03 <u>AO_V04</u>		.00	003 40.00 50.	00 e	004	t [s]
<ul> <li>BI02</li> <li>BI12</li> </ul>	2 📝 BI03 2	☑ BI04	<b>B</b> I05	V BI06	BI07 BI08	V 8109	💟 BI10	
	T			1			1	
	T			1	1		1	7
	T			1	1		1	
				]	]		1	)
	T			1			1	1
	1			1				
	T			1				]
				1				1
	1			1				1
	T			1	]			77
	T			1	]		1	1
	T				]		1	
	<ul> <li>✓ AO</li> <li>64.00</li> <li>60.00</li> <li>56.00</li> <li>0</li> <li>0</li> <li>0</li> <li>0</li> </ul>	♥ A0_V02         ♥ A0_V           64.00         f01           60.00         f1Hz           56.00         0           0         10.0           9         BI02         ♥ BI03           ♥ BI02         ♥ BI03           ♥ BI02         ♥ BI03	☑ A0_V02         ☑ A0_V03         ☑ A0_V04           64.00         f01	✓ A0_V02       ✓ A0_V03       ▲ A0_V04         64.00       f0H-2       002         60.00       -       -         56.00       -       -         0       10.00       20.00       30         ✓ BI02       ✓ BI03       ✓ BI04       ✓ BI05         ✓       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1	Ø.000       Ø.002       Ø.002         60.00       002       002         56.00       0       002         0       10.00       20.00         8102       Ø.003       Ø.004         Ø.01       0.00       30.00	94.00       001       002       003         60.00       1       002       003         56.00       0       10.00       20.00       30.00       40.00       50.00         9       10.00       20.00       30.00       40.00       50.00         9       10.00       20.00       30.00       40.00       50.00         9       102       1003       1000       20.00       30.00       40.00       50.00         9       1012       1003       1000       20.00       30.00       40.00       50.00         9       1012       1       1       1       1       1       1         1       1       1       1       1       1       1       1       1       1         1	W       A0_V03       A0_V04         94.00       F(Ha2)       002       003         60.00       0       002       003         56.00       0       1       002       003         56.00       0       10.00       20.00       30.00       40.00       50.00       6         W       B102       W       B105       W       B107       W       B108       W       B109         W       B12       X       X       B104       W       B105       W       B107       W       B108       W       B109         W       B112       X       X       X       X       X       X       B109       W       B109       W <t< th=""><th>W A0_002       W A0_003       A0_04         94.00       F(Ha2)       002       003       -       -       004         60.00       -       -       -       -       -       004         56.00       -       -       -       -       -       -       -         56.00       -</th></t<>	W A0_002       W A0_003       A0_04         94.00       F(Ha2)       002       003       -       -       004         60.00       -       -       -       -       -       004         56.00       -       -       -       -       -       -       -         56.00       -

Figure 44

Right click and increase the height of the graphics. The next step is to select only the binaries "BI01", "BI02", "BI03" and "BI04".



Figure 45

Rua Visconde de Ouro Preto, 77 - Bairro Custódio Pereira - Uberlândia – MG - CEP 38405-202.<br/>Phone (34) 3218-6800Phone (34) 3218-6800Fax (34) 3218-6810Home Page: www.conprove.com-E-mail: conprove@conprove.com.br

![](_page_30_Picture_0.jpeg)

# 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.

![](_page_30_Figure_4.jpeg)

According to the previous figure, it can be concluded that the time for marking 1 is 21.10 seconds and for the second, 36.80 seconds. The next figure shows the position of the last two elements.

![](_page_31_Picture_0.jpeg)

![](_page_31_Figure_2.jpeg)

Figure 47

According to the previous figure, it can be concluded that the time for marking 3 is 59.50 seconds and for marking 4 it is 75.20 seconds.

#### 7.12 Inserting marking

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

![](_page_31_Figure_7.jpeg)

Figure 48

Rua Visconde de Ouro Preto, 77 - Bairro Custódio Pereira - Uberlândia – MG - CEP 38405-202.<br/>Phone (34) 3218-6800Phone (34) 3218-6800Fax (34) 3218-6810Home Page: www.conprove.comE-mail: conprove@conprove.com.br

![](_page_32_Picture_0.jpeg)

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

Add Marking	×
Time: 21,10 s	
Descr: Mark01	
🕑 Visible	
ОК	Cancel
Figure 4	
Figure 4.	,
Add Marking	×
Time: 36,80 s	
Descr: Mark02	
🔽 Visible	
ОК	Cancel
Figure 50	
Add Marking	×
Time: 59,50 s	
Descr: Mark03	
🔽 Visible	
OK	Canaal
	Cancer
Figure 51	l
Add Marking	×
Time: 75,20 s	
Descr: Mark04	
, Visible	
ОК	Cancel
Figure 52	2

Rua Visconde de Ouro Preto, 77 - Bairro Custódio Pereira - Uberlândia – MG - CEP 38405-202.<br/>Phone (34) 3218-6800Phone (34) 3218-6800Fax (34) 3218-6810Home Page: www.conprove.com-E-mail: conprove@conprove.com.br

![](_page_33_Picture_0.jpeg)

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

![](_page_33_Figure_3.jpeg)

Figure 53

# 7.13 *Time evaluation*

Clicking on the *"Time"* field, as shown in the next figure, you can configure 4 time evaluations of operations as follows.

![](_page_34_Picture_0.jpeg)

۵	l 🗅 🞽	) 🚽 🖓	amp 2.02.191 (64 B	its) - CE-6710 (01	61117)												-	o ×	
Ar	quivo	Home	Display Softwa	ire Options														^	?
CH	Direc annels	Hrd Set Sync Set Connecti	୍ର୍ବତ GOOSE Set. <sup>5</sup> ୦ SV Set. on are	Insert New	sert Copy elete Sel. elete All Sequer	Auto R Va Separa	ef Angle te Nodes/B	Reec in Tes	In Edition	•	Start Stop	ŭ № Repetiti	ons 0 🗘	Static eneration •	Settings	Report	Units L	ayout	
	Sequen	ces		-	K Wavefor	n Phasors	Trajecto	ries / Ha	armonics Synchr	scope Pla	ine 7							• ×	<
	004 Chanr	81-4	ition	14,70 s	NO01 - Volta	ges V	AO_V02	[	✓ AO_V03	AO_V0	4								
NO01	Point           Va           Vb           Ia           Ib           Ic           UD01           UD02           UD03           UD04	Channel           AO_V01           AO_V02           AO_101           AO_0101           AO_0102           AO_103           AO_104           AO_105           AO_106	Definitions Frequency thor 1.30 s: tRee			66.00 65,00 64,00 62,00 61,00 60,00 59,00 58,00 57,00 56,00 <b>≠</b> 0	001 f[Hz]					003							80
Eva	luations						_									_		<b>џ</b> )	×
đ	+		Name	Ramp	Condition	Туре		Output	Nom, Value	Dev	Dev.+	Real Value	Total Deviatio	r Status					
Col	-	eve	81-1_pkp 81	-1 - NO01	BI01 (†)	Frequency	▼ Va		58,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 Hz					alc	
÷	Ŷ		₩ 81-2_pkp 81	-2 - NO01	BI02 (↑)	Frequency	▼ Va		56,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 Hz						H
scilo	*		81-3_pkp 81	-3 - NO01	BI03 (†)	Frequency	▼ Va		62,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 Hz						
0			81-4_pkp 81	-4 - NO01	BI04 (↑)	Frequency	▼ Va		64,00 Hz	10,00 mHz	10,00 mHz	0 Hz	0 Hz						
E	valuation	s GOO	SE TimeStamp Repo	ort															
	Error List	Protec	tion Status																
4	ON Li	ine	New				4	Aux. Sourc	:e 110,00 V Heat	ing: 09	6								
	Figure 54																		

Change the name "Eval. 1" to "81-1\_t" 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 105ms. The figure below shows these settings.

Eval	uatior	ıs										
Ê	$\Phi_{\rm c}$	a	Name	Ignore Before	Start	End	Tnominal	Tdev-	Tdev+	Treal	Tdev	Status
ő	-	<u>E</u>	81-1_t	#Mark01	#Mark01	BI01 (↑)	2,00 s	105,0 ms	105,0 ms	0 s	0 s	
0scilog.	<b>₽</b> ↓											
Ev	aluatio	ons	_ GOOSE TI	meStamp Report	]							
E	rror Li	st	Protection	Status								
<b>\$</b>	ON	Line		New				Aux. Source 11	0,00 V Heat	ing: 0%		
						Fig	ure 55					

By clicking on the "+" icon, 3 more evaluations are added and their adjustments are made in a similar way to the first evaluation.

Eval	uatior	ns										
ď	+	a	Name	Ignore Before	Start	End	Tnominal	Tdev-	Tdev+	Treal	Tdev	Status
ů	-	<u>,</u>	81-1_t	#Mark01	#Mark01	BI01 (†)	2,00 s	105,0 ms	105,0 ms	0 s	0 s	
	Ŷ	Γ.	81-2_t	#Mark02	#Mark02	BI02 (↑)	1,00 s	105,0 ms	105,0 ms	0 s	0 s	
scilo	+		81-3_t	#Mark03	#Mark03	BI03 (↑)	2,00 s	105,0 ms	105,0 ms	0 s	0 s	
ŏ			81-4_t	#Mark04	#Mark04	BI04 (↑)	1,00 s	105,0 ms	105,0 ms	0 s	0 s	
Eva	Evaluations		GOOSE Ti	meStamp Report								
E	rror Li	st	Protection	Status								
47	ON	Line		New			1	Aux. Source 110	0,00 V Heat	ing: 0%		
						T*						

Figure 56

Rua Visconde de Ouro Preto, 77 - Bairro Custódio Pereira - Uberlândia – MG - CEP 38405-202.<br/>Phone (34) 3218-6800Phone (34) 3218-6800Fax (34) 3218-6810Home Page: www.conprove.comE-mail: conprove@conprove.com.br

![](_page_35_Picture_0.jpeg)

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

![](_page_35_Figure_3.jpeg)

The following figure shows the operating times.

![](_page_35_Figure_5.jpeg)

![](_page_36_Picture_0.jpeg)

## 8. Report

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

Presentation Setting		×
Language Inglês En-US		
🖃 - 🔽 All		
General Data of Test		
	vice	
🔽 Local of Installation		
	s	
	ttings	
🗄 · 🔽 Sequences		
🗄 🖂 Test Results		
Notes and Observations		
····· 🔽 Connections		
	OK	Cancel

Figure 59

![](_page_36_Picture_6.jpeg)

Figure 60

Rua Visconde de Ouro Preto, 77 - Bairro Custódio Pereira - Uberlândia – MG - CEP 38405-202.<br/>Phone (34) 3218-6800Phone (34) 3218-6800Fax (34) 3218-6810Home Page: www.conprove.com-E-mail: conprove@conprove.com.br

![](_page_37_Picture_0.jpeg)

# **APPENDIX** A

#### **A.1 Terminal Designations**

![](_page_37_Figure_4.jpeg)

Figura A-4 Diagrama geral para 7SA6\*1\*-\*B/K

(montagem embutida em painel ou montagem em cubículo)

Rua Visconde de Ouro Preto, 77 - Bairro Custódio Pereira - Uberlândia – MG - CEP 38405-202.<br/>Phone (34) 3218-6800Phone (34) 3218-6800Fax (34) 3218-6810Home Page: www.conprove.comE-mail: conprove@conprove.com.br

![](_page_38_Picture_0.jpeg)

# A.2 Technical data

#### Elementos da Freqüência

Quantidade	4, dependendo do ajuste selecionado em f< ou f>
5	

#### Valores de Pickup

f> ou f< ajustável para cada elemento		
para f <sub>N</sub> = 50 Hz	45,50 Hz a 54,50 Hz	incrementos 0.01 Hz
para f <sub>N</sub> = 60 Hz	55,50 Hz a 64,50 Hz	incrementos 0.01 Hz

#### Tempos

Tempos de pickup f>, f<	Aprox. 85 ms				
Tempos de dropout f>, f<	Aprox. 30 ms	29-			
Temporizações T	0,00 s a 600,00 s	Incrementos 0.01 s			
Os tempos ajustados são puras temporizações. Note em tempos de dropout: Dropout foi obtido pela corrente = 0 A e tensão = Ao se obter dropout através de uma mudança de dropout	: 0 ∨. ∋ freqüência abaixo do limite de	dropout, estende os tempos de			

#### Freqüência de Dropout

$\Delta f =   valor de pickup - valor de dropout  $	Aprox. 20 mHz

#### Faixas Operacionais

Na faixa de tensão	aprox. 0.65 · U <sub>N</sub> até 230 V (fase-fase)
Na faixa de freqüência	25 Hz a 70 Hz

#### Tolerâncias

Freqüências f>, f< na faixa específica (f <sub>N</sub> ± 10 %)	15 mHz na faixa U <sub>LL</sub> : 50 V a 230 V
Temporizações T(f<, f>)	1% do valor de ajuste ou 10 ms

![](_page_39_Picture_0.jpeg)

# **APPENDIX B**

Equivalence of software parameters and the relay under test.

Table 1				
Ramp Software		Siemens 7SA6 Relay		
Parameter	Figure	Parameter	Figure	
81-1_pkp	40	81- 1 Pickup	17	
81-2_pkp	41	81- 2 Pickup	17	
81-3_pkp	41	81- 3 Pickup	17	
81-4_pkp	41	81- 4 Pickup	17	
81-1_t	55	81-1 Time delay	17	
81-2_ t	56	81- 2 Time delay	17	
81-3_ t	56	81- 3 Time delay	17	
81-4_ t	56	81- 4 Time delay	17	