SACE PR010/T
test unit annex

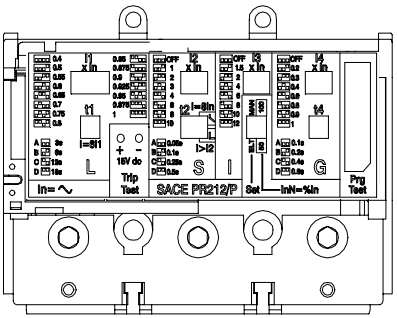
CONTENTS

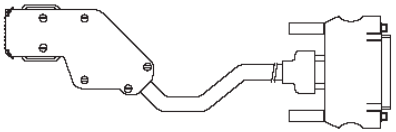
1. Indications on the functions of the unit SACE PR010/T (version SW 7.0)

Electronic releases foreseen [also known as DUT (Device Under Test)]:

SACE PR111	(in all IEC versions)
SACE PR112	(in all IEC versions)
SACE PR113	(in all IEC versions)
SACE PR111-A	(in all UL versions)
SACE PR112-A	(in all UL versions)
SACE PR113-A	(in all UL versions)
SACE PR121	(in all versions)
SACE PR122	(in all versions)
SACE PR123	(in all versions)
SACE PR212/P	(with test connector on the front)
SACE PR212/MP	(with test connector on the front)
SACE PR222DS	(in all versions)
SACE PR222MP	(in all versions)
SACE PR223EF	(in all versions)

2. SACE PR212/P protection release



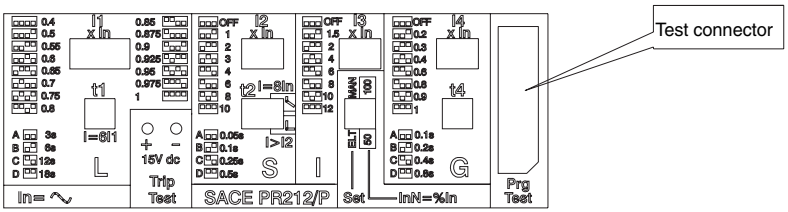


2.1 Operation mode menu tree

1	2	3	4	5	6	7	8	9
Operation mode	7. Select DUT (PR212/P)	1.Test	1. Protections	1. Automatic	Start test (select SET ELT)			Create report
				2. Manual	1. Default setting	Start test		
					2. User setting	Set parameters Start test		
		2. Reading	1.Ammeter	Read currents				
			2. Config./Param.	1. DUT configuration and param.	1. Manual parameters	Display DUT configuration and parameters		
					2. Electronic parameters	Display DUT configuration and parameters		
				2. Default parameters	1. Only for test	Display default configuration and parameters		
					2. Operative	Display default configuration and parameters		
			3. Information	Read release identification, SW version and Serial Number				
			4. Tripping parameters	Display tripping parameters				
		3. Programming	1. Change DUT parameters	1. DUT config.	Change DUT configuration parameters			
				2. DUT parameters (ELT)	Change DUT protection parameters			
			2. Default parameters	Program DUT with default parameters for normal operation				
			3. Def. default parameters	1. Only for test	Define DUT protection parameters			
				2. Operative	Define DUT protection parameters			

2.2 Indications on operation

- The SACE PR010/T unit can be used only with SACE PR212/P and SACE PR212/P-LSIG protection releases with test connectors on the front.



- The automatic test and the manual test with default parameters may be performed only by turning the protection release to electronic SET with the dip switch provided.
- The manual test may be performed either with electronic SET or with manual SET. In the case of manual test with manual SET, thresholds and curves must be selected with the dip-switches

on the protection; they are automatically updated on the display of the PR010/T unit, where only the test current and the phase on which it is to be applied must be set.

- If during test, reading or programming operations, CB type and CT current rating are not yet defined, the following message will be displayed:

```
WARNING
Config. not valid
```

To set the missing data, proceed as follows:

1. Press ENTER
2. Select the type of CB and the current rating of the CT
3. Store the settings by pressing ENTER

WARNING

Connect the test wire provided (between the SACE PR010/T and the SACE PR212/P) the right way round (see drawing in par. 6).

Manual test example for release PR212/P

NOTE: the data indicating the type of CB and protection, the rated current of the CTs and the Neutral setting, are automatically identified by the PR010/T.

In this example, protection function "S" is tested with curve t=k, threshold I2=1.00*In, curve t2=0.5s supplying a fault current equivalent to 2 times the rated current (In).

1.	Set the PR212/P in Manual mode with: I1at 1In curve D, I2 at 1 In curve D T=K, I3 and I4 in OFF.	
2.	From the main menu select 1.	(Operation mode)
3.	Select the PR212 unit with x.	(PR212)
4.	Select the type of activity with 1.	(Test)
5.	Select the type of test with 1.	(Protections)
6.	Select the test mode with 2.	(Manual)
7.	Select the type of setting used to test the protections with 2.	(User setting)
8.	This appears: "Manual test with MAN parameters, press ENTER to proceed".	
9.	Select the protection function you want to test with 2.	(S protection test)

10. Using the arrow keys, set I-F=2.00:

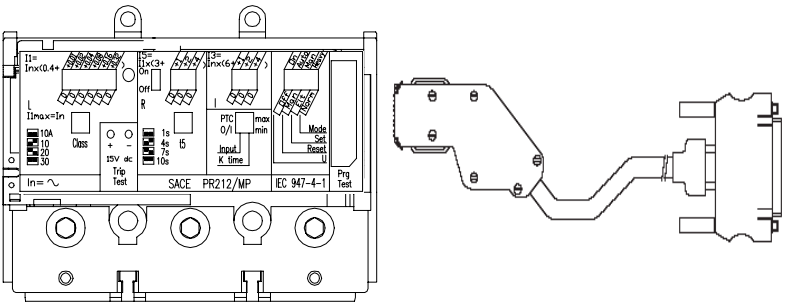
```
S-PROT: t=k,  ON
I2: 1.0  In => 400 A
T2: 0.5 s
I-f: 2.00 => 800 A(*)
```

(*) In this example, the automatically identified rating of the current sensor is 400A.

11. Select the phase (or phases) on which to simulate the fault current. (L1+L2+L3)

12. Press ENTER to activate fault simulation.

3. SACE PR212/MP protection release

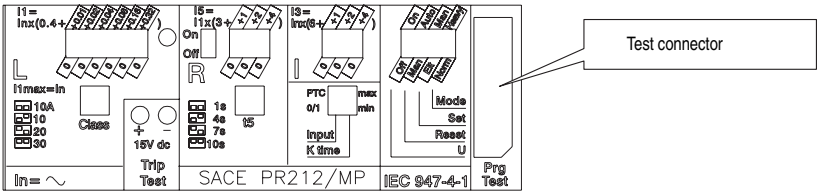


3.1 Operation mode menu tree

1°	2°	3°	4°	5°	6°	7°	8°	9°
1. Operation mode	8. Select DUT (PR212/MP)	1. Test	1. Protections	1. Automatic	Start test (select SET ELT)			
				1. Manual	1. Default setting	Start test		Create report
					2. User setting	Set parameters	Start test	
			2. Trip test	Start test				
			3. Set coil	Start test				
			4. Reset coil	Start test				
		2. Reading	1. Currents	Read currents				
			2. Config./Param.	1. DUT config./param.	1.Manual parameters	Display DUT configuration and parameters		
					2. Electronic parameters	Display DUT configuration and parameters		
				2.Def.parameters in PR010/T	1. Only for test	Display DUT default configuration and parameters		
					2. Operative	Display DUT default configuration and parameters		
			3. Inputs	Read inputs				
			4. Tripping parameters	Display tripping parameters				
			5. Information	Read release identification, SW version and Serial Number				
		3. Programming	1. Change DUT config./par.	1. DUT configuration	Change DUT configuration parameters			
				2.DUT parameters (ELT)	Change DUT protection parameters			
			2. Download default parameters	Program DUT with default parameters for normal operation				
			3. Def. parameters in PR010/T	1. For test	Define DUT protection parameters			
				2. Operative	Define DUT protection parameters			

3.2 Indications on operation

- The SACE PR010/T unit can be used with all SACE PR212/MP releases with test connectors on the front.



- For the test with SACE PR212/MP protection releases version 1 (with automatic data reading by the PR010/T unit) the maximum test current is 7.3*In; that is why the automatic test will test the protection functions in accordance with the above.
- The automatic test and the manual test with the default parameter set can only be performed if the protection release is configured in Electronic SET (ELT) mode using the dip switch provided.
- The manual test with the user's parameter set can be run both in electronic SET (ELT) and in manual SET (MAN) mode. In the case of manual test with manual SET, thresholds and curves must be selected with the dip-switches on the protection; they are automatically updated on the display of the PR010/T unit, where only the test current and the phase on which it is to be applied must be set.
- If the PTC for protection against overtemperature is not present, during the tests it is necessary to set the "Input" dip-switch as the generic input (Input = 0/1).
- The "Welded contacts" (WC) input has to be at 0V (no alarm) during the tests.
- At the end of each test, the PR010/T unit waits until the thermal memory has returned to zero before proceeding with any subsequent tests in order to avoid any overlap in operation between the function being tested and the overload function (L).
- For the test on the protection function against locked rotor (R), the PR010/T unit waits for an initial interval, which depends on the class specified for the L protection function (max. duration 24s) before performing the test.
- If during test, reading or programming operations, CB type and CT current rating are not yet defined, the following message will be displayed:

```
WARNING
Config. not valid
```

To set the missing data, proceed as follows:

1. Press ENTER
2. Select the type of CB and the current rating of the CT
3. Store the settings by pressing ENTER

WARNING

Connect the test wire provided (between the SACE PR010/T and the SACE PR212/MP) the right way round (see drawing in par. 9).

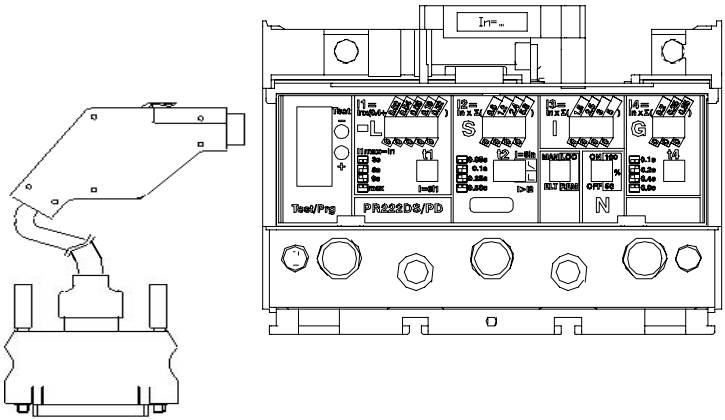
Example of an automatic test application on the PR212/MP release

NOTE: the data indicating the type of CB and protection and the current rating of the CTs are automatically identified by the PR010/T test unit.

In this example, all the protection functions implemented by the SACE PR212/MP release are tested automatically:

1. Set the PR212/MP in electronic set mode.	(ELT)
2. From the main menu select 1.	(Operation mode)
3. Select the PR212MP unit with x.	(PR212/MP)
4. Select the type of activity with 1	(Test)
5. Select the type of test with 1	(Protections)
6. Select the test mode with 1	(Automatic)
7. Pressing ENTER enables a simulation of the failure for each protection function.	

4. SACE PR222DS protection release

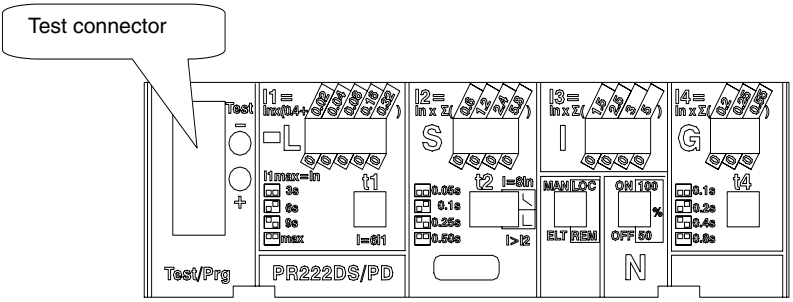


4.1 Operation mode menu tree

1°	2°	3°	4°	5°	6°	7°	8°	9°
1. Operation mode	Select DUT (PR222DS)	1. Test	1. Protections	1. Automatic	Start test (select Electronic Set)			Create test report
				2. Manual	1. Default setting	Start test		
					2. User setting	Set parameters	Start test	
			2. Trip	Start test				
		2. Reading	1. Currents	Read currents				
			2. Last trip.	Display tripping parameters				
			3. Config./param.	1. DUT config.	Display DUT configuration parameters			
				2. DUT parameters	1. Manual parameters	Display manual set parameters		
					2. Electronic parameters	Display electronic set parameters		
				3. Default parameters	1. For test	Display default test parameters		
					2. Operative	Display default operative parameters		
			4. Communication par.	Display communication parameters for system bus				
			5. Information	Read release identification, SW version and Serial Number				
		3. Programming	1. Parameters	Change DUT protection parameters				Store protection unit parameters
			2. Default download	Program DUT with default operative parameters defined in "programming/Define/Manual/Default set"				
			3. Default definition	1. Only for test	Define default par. used for: "Test/ Protections/Manual/Default set"			Store parameters in the PR010/T test unit
				2. Operative	Define default par. for: "Program/Default download"			
			4. Communication par.	Define communication par. for system bus				Store parameters in the PR010/T test unit

4.2 Indications on operation

- The SACE PR010/T unit can be used with all SACE PR222DS/P and SACE PR222DS/PD releases by connecting the test unit to the protection unit with the cable provided, to be inserted in the test connector on the front.



- It is not necessary for the auxiliary supply to be present in order to use the above releases with the PR010/T unit.
- During use of the PR010/T unit, communication between the SACE PR222DS/PD releases and the supervision system connected to them is interrupted.
- Tests must be carried out with the circuit breaker off.
- Automatic testing and manual setting with default parameters must be performed only by configuring the release in Electronic SET (ELT) with the dip switch provided.
- The manual test may be performed either with Electronic SET or with manual SET. In the case of manual test with manual SET, thresholds and curves must be selected with the dip-switches on the protection; they are automatically updated on the display of the PR010/T unit, where only the test current and the phase on which it is to be applied must be set.
- If during test, reading or programming operations, CB type and CT current rating are not yet defined, the following message will be displayed:

```
WARNING
Config. not valid
```

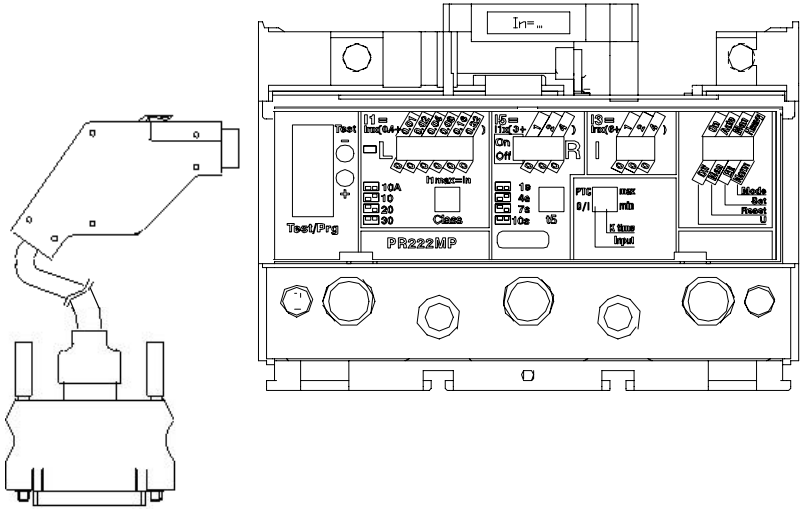
Example of an automatic test application on the PR222DS release

NOTE: the data indicating the type of CB and protection, the rated current of the CTs and the Neutral setting, are automatically identified by the PR010/T.

In this example, all the protection functions implemented by the SACE PR222DS/P and SACE PR222DS/PD release are tested automatically:

1.	From the main menu select	1	(Operation mode)
2.	Select the PR222DS unit with	x	(PR222DS)
3.	Select the type of activity	1	(Test)
4.	Select the type of test	1	(Protections)
5.	Select the test mode with	1	(Automatic)
6.	Pressing ENTER enables a simulation of the failure for each protection function		

5. SACE PR222MP protection release

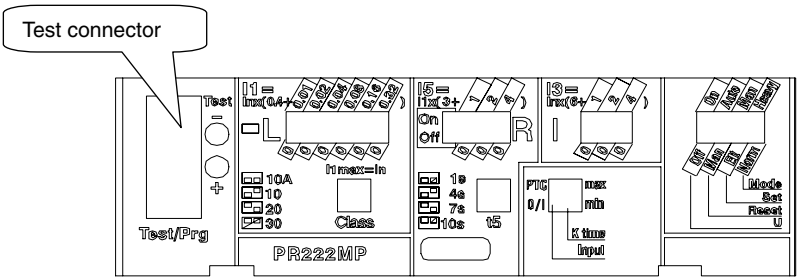


5.1 Operation mode menu tree

1°	2°	3°	4°	5°	6°	7°	8°	9°
1. Operation mode	8. Select DUT (PR222MP)	1. Test	1. Protections	1. Automatic	Start test (select SET ELT)			Create report
				2. Manual	1. Default setting	Start test		
					2. User setting	Set parameters	Start test	
			2. Trip test	Start test				
			3. Set coil	Start test				
			4. Reset coil	Start test				
		2. Reading	1. Currents	Read currents				
			2. Config./Param.	1. DUT config./param.	1.Manual parameters	Display DUT configuration and parameters		
					2. Electronic parameters	Display DUT configuration and parameters		
				2. Def. parameters in PR010/T	1. Only for test	Display DUT default configuration and parameters		
					2. Operative	Display DUT default configuration and parameters		
			3. Inputs	Read inputs				
			4. Tripping parameters	Display tripping parameters				
			5. Information	Read release identification, SW version and Serial Number				
		3. Programming	1. Change DUT config./par.	1. DUT configuration	Change DUT configuration parameters			
				2.DUT parameters (ELT)	Change DUT protection parameters			
			2. Download default parameters	Program DUT with default parameters for normal operation				
			3. Def. parameters in PR010/T	1. For test	Define DUT protection parameters			
				2. Operative	Define DUT protection parameters			

5.2 Indications on operation

- The SACE PR010/T unit can be used only with SACE PR222MP protection releases with test connectors on the front.



- Per For the test with SACE PR222MP protection releases version 1 (with automatic data reading by the PR010/T unit) the maximum test current is 7.3*In; that is why the automatic test will test the protection functions in accordance with the above.
- The automatic test and the manual test with the default parameter set can only be performed if the protection release is configured in Electronic SET (ELT) mode using the dip switch provided.
- The manual test with the user's parameter set can be run both in electronic SET (ELT) and in manual SET (MAN) mode. In the case of manual test with manual SET, thresholds and curves must be selected with the dip-switches on the protection; they are automatically updated on the display of the PR010/T unit, where only the test current and the phase on which it is to be applied must be set.
- If the PTC for protection against overtemperature is not present, during the tests it is necessary to set the "Input" dip-switch as the generic input (Input = 0/1).
- The "Welded contacts" (WC) input has to be at 0V (no alarm) during the tests.
- At the end of each test, the PR010/T unit waits until the thermal memory has returned to zero before proceeding with any subsequent tests in order to avoid any overlap in operation between the function being tested and the overload function (L).
- For the test on the protection function against locked rotor (R), the PR010/T unit waits for an initial interval, which depends on the class specified for the L protection function (max. duration 24s) before performing the test.
- If during test, reading or programming operations, CB type and CT current rating are not yet defined, the following message will be displayed:

WARNING Config. not valid

To set the missing data, proceed as follows:

1. Press ENTER
2. Select the type of CB and the current rating of the CT
3. Store the settings by pressing ENTER

WARNING

Connect the test wire provided (between the SACE PR010/T and the SACE PR222MP) the right way round (see drawing in par. 5)

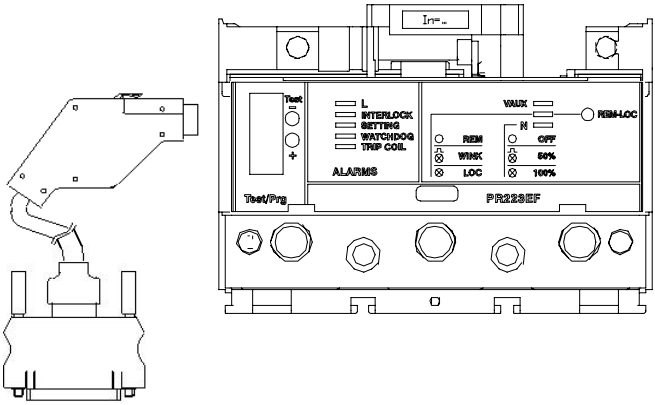
Example of an automatic test application on the PR222MP release

NOTE: the data indicating the type of CB and protection and the current rating of the CTs are automatically identified by the PR010/T test unit.

In this example, all the protection functions implemented by the SACE PR212/MP release are tested automatically:

1.	Set the PR222MP in electronic set mode	(ELT)
2.	From the main menu select 1	(Operation mode)
3.	Select the PR222MP unit with x	(PR222MP)
4.	Select the type of activity with 1	(Test)
5.	Select the type of test with 1	(Protections)
6.	Select the test mode with 1	(Automatic)
7.	Pressing ENTER enables a simulation of the failure for each protection function	

6. SACE PR223EF protection release

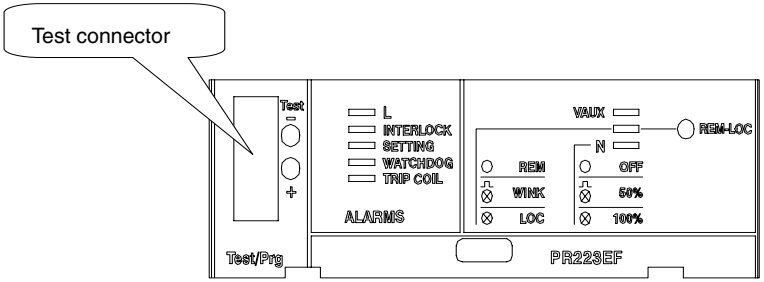


6.1 Operation mode menu tree

1°	2°	3°	4°	5°	6°	7°	8°	9°
1. Operation mode	8. Select DUT (PR223EF)	1. Test	1. Protections	1. Automatic	Start test (select Electronic Set)			Create test report
				2. Manual	1. Default setting	Start test		
					2. User setting	Set parameters	Start test	
			2. Trip	Start test				
		2. Reading	1. Measurements	1. Currents	Read measured currents			
				2. Voltages	Read measured line and phase voltages			
				3. Frequency	Read measured frequency			
				4. Peak factor	Read peak factors			
			2. Last trip	Display data of last 20 trips				
			3. Config./param.	1.DUT config.	Display DUT configuration and parameters			
				2. DUT parameters	Display protection parameters			
				3. Default parameters	1. For test	Display default test parameters		
					2. Operative	Display default operative parameters		
			4. Communication par.	Display communication parameters for system bus				
			5. Information	Read release identification, SW version and Serial Number				
		3. Programming	1. Parameters	Change DUT protection parameters				Store protection unit parameters
			2. Default download	Program DUT with default operative parameters defined in "programming/Define Default/Operative"				
			3. Define default	1. Only for test	Define default par. used for: "Test/ Protections/Manual/Default set"			Store parameters in the PR010/T test unit
				2. Operative	Define default par. for: "Program/Default download"			
			4. Communication par.	Define communication par. for system bus				Store protection unit parameters

6.2 Indications on operation

- The SACE PR010/T unit can be used with all SACE PR223EF releases by connecting the test unit to the protection unit with the cable provided, to be inserted in the test connector on the front.



- It is not necessary for the auxiliary supply to be present in order to use the above releases with the PR010/T unit.
- During use of the PR010/T unit, communication between the SACE PR223EF releases and the supervision system connected to them is interrupted.
- The tests must be carried out with the circuit breaker off.
- If during test, reading or programming operations, CB type and CT current rating are not yet defined, the following message will be displayed:

```
WARNING
Config. not valid
```

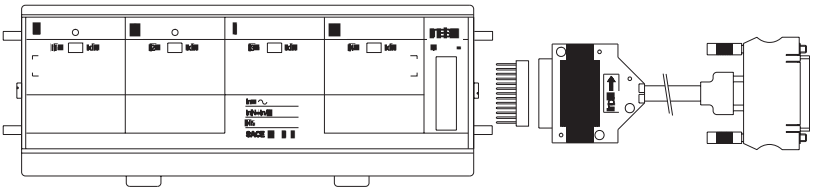
Example of an automatic test application on the PR223EF release

> **NOTE:** the data indicating the type of CB and protection, the current rating of the CTs and the neutral setting are automatically identified by the PR010/T test unit.

In this example, all the protection functions implemented by the SACE PR223EF release are tested automatically:

1. From the main menu select	1	(Operation mode)
2. Select the PR223EF unit with	x	(PR223EF)
3. Select the type of activity	1	(Test)
4. Select the type of test	1	(Protections)
5. Select the test mode	1	(Automatic)
6. Pressing ENTER enables a simulation of the failure for each protection function.		

7. SACE PR111/P protection release



7.1 Default setting for automatic PR111/P testing

To test the protection functions in automatic mode, first set the PR111/P protection unit as follows:

Protection function	Threshold	Curve
L	0.4 x In	B
S	3 x In	C; $I^2t=k$
I	8 x In	-
G	0.8 x In	B

7.2 Operation mode menu tree

1°	2°	3°	4°	5°	6°	7°
1. Operation mode	1. Select DUT (PR111)	1. Protections	1. Automatic	Start test		Create report
			2. Manual	Set parameters	Start test	
		2. I inst protection	Start test			

7.3 Indications on operation

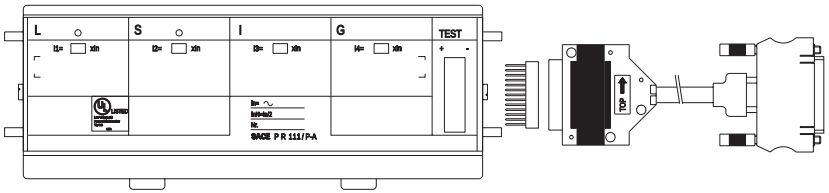
In the case of testing with the SACE PR010/T unit for G protection function, the maximum trip time tolerance value is 35%. The minimum threshold is 0.6 x In for the manual test.

Example of an automatic test application on the PR111/LSI unit fitted on CB E1B12, with CT = 800 A, Neutral = 50%.

1. From the main menu select 1	(Operation mode)
2. Select the PR111 unit with 1	(PR111)
3. Select the version of the PR111 with 2	(PR111-LSI)
4. Enter 1 to select the Neutral setting	(Neutral = 50%)
5. Enter 2 to select the type of CB	(E1B12)
6. Select the current rating of the CTs fitted with 3	(800 A)
7. Select the type of test with 1	(Protections)
8. Select the test mode with 1	(Automatic)

[Make sure the default setting is programmed for automatic testing as shown under the heading "Default setting for automatic PR111/P testing"].

8. SACE PR111/P-A protection release



8.1 Default setting for automatic PR111/P-A testing

To test the protection functions in automatic mode, first set the PR111/P-A protection unit as follows:

Protection function	Threshold	Curve
L	0.4 x In	B
S	3 x In	C; $I^2t=k$
I	8 x In	-
G	0.4 x In	B

8.2 Operation mode menu tree

1°	2°	3°	4°	5°	6°	7°
1. Operation mode	4. Select DUT (PR111-A)	1. Protections	1. Automatic	Start test		Create report
			2. Manual	Set parameters	Start test	
		2. I inst protection	Start test			

8.3 Indications on operation

In the case of testing with the SACE PR010/T unit for G protection function, the maximum trip time tolerance value is 35%.

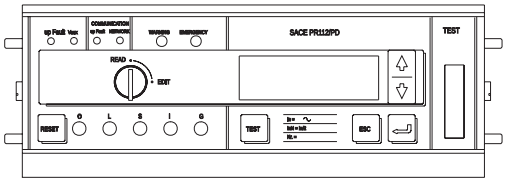
Automatic test example for unit PR111/P-A LSI mounted on CB E1B12, with CT = 800 A, Neutral = 50%.

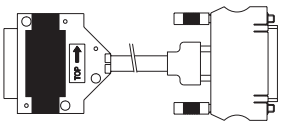
1. From the main menu select 1	(Operation mode)
2. Select the PR111-A unit with 4	(PR111-A)
3. Select the version of the PR111-A with 2	(PR111-A/LSI)
4. Enter 1 to select the Neutral setting	(Neutral = 50%)
5. Enter 2 to select the type of CB	(E1B12)
6. Select the current rating of the CTs fitted with 3	(800 A)
7. Select the type of test with 1	(Protections)
8. Select the test mode with 1	(Automatic)

[Make sure the default setting is programmed for automatic testing as shown under the heading "Default setting for automatic PR111/P-A testing"].

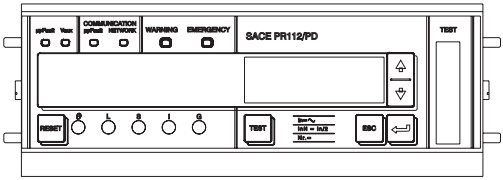
9. PR112/P and SACE PR112/PD protection release

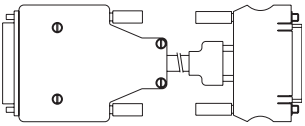
9.1 Version with key (last letter in serial number A ÷ D)





9.2 Version without key (last letter in serial number M ÷ Z)





9.3 Operation mode menu tree

1°	2°	3°	4°	5°	6°	7°	8°	9°	10°
1. Operation mode	2. Select DUT (PR112)	1. Select DUT (PR112A:D) 2. Select DUT (PR112M:Z)	1. Test	1.Protections	1.Automatic	Start test			Create report
					2. Manual	1. Default setting	Start test		
						2. User setting	Set parameters	Start test	
				2. I inst protection	Start test				
				3. Trip	Start test				
			2. Reading	1. Ammeter	Read currents				
				2. Config./Param.	1. DUT config.	Display DUT configuration			
					2. DUT parameters	Display DUT parameters			
					3. Default parameters	1.Only for test	1. DUT config.	Display DUT default config.	
							2. DUT parameters	Display DUT default param.	
						2.Operative	1. DUT config.	Display DUT default config.	
							2. DUT parameters	Display DUT default param.	
				3. Information	Read release identification, SW version and Serial Number				
			3. Programming	1. Change DUT parameters	1. DUT config.	Change DUT configuration parameters			
					2. DUT parameters	Change DUT protection parameters			
				2. Default parameters	Program DUT with default parameters for normal operation				
				3. Define default parameters	1. Only for test	1. DUT config.	Def. DUT configuration		
						2. DUT parameters	Def. DUT parameters		
					2. Operative	1. DUT config.	Def. DUT configuration		
						2. DUT parameters	Def. DUT parameters		

9.4 Indications on operation

- The SACE PR010/T test unit can be used:

- in all SACE PR112/P and SACE PR112/PD protection releases in the version "without key".

- in all SACE PR112/P and SACE PR112/PD protection releases, in the version "with key", having Sw version 2.20 or later and serial number later than No. xxxxx**03**x (for PR112/P) or No. xxxxx**05**x (for PR112/PD).

> **NOTE:** The PR112 software release can be read on the display by choosing in sequence:

- Config/Program.
- Information
- The SACE PR112/PD releases must be connected to the auxiliary power supply for use with the SACE PR010/T unit.

Remarks for PR112 in version "with key"

- G protection function test:
- If working in automatic mode, the threshold current must be set to a value higher than or equal to 0.4xIn (if it is set at a lower value the PR010/T unit will reset it at 0.4xIn during the test phase). The test current is equal to 2.5 times the threshold current.
- In the case of manual mode the test current is 1.5xIn.
- It is possible that after a test (with trip) on G protection function other trips of the protection will occur during the next 2s.
- Contact wear for PR112:
- During testing on the PR112, with timing before trip higher than 10s, there could be an increase in the indications contact wear and number of operations. After some tests wear could reach 100% of the value, resulting in the appearance of the EMERGENCY message. This indication can be reset by the customer by means of the following procedure:
- Choose in READ mode the page of the contact wear indication
- Choose EDIT mode by turning the key
- Hold down the "Up" and "Down" buttons simultaneously for at least 5 seconds.
- In this way the contact wear and number of operations indications will be reset to zero.

WARNING

Connect the test wire provided (between the SACE PR010/T and the SACE PR112) the right way round (see the adhesive labels on the connectors).

Manual test example for release PR112/P (vers. "without key").

> **NOTE:** the data indicating the type of CB and protection, the rated current of the CTs and the Neutral setting are automatically identified by the PR010/T test unit.

In this example, protection function "I" is tested with curve t=k, threshold I3=1.5*In, supplying a fault current equivalent to 2 times the rated current (In).

1. From the main menu select	1	(Operation mode)
2. Select the PR112 unit with	x	(PR112)
3. Select the M÷Z version	2	(PR112) (M÷Z)
4. Select the type of activity with	1	(Test)
5. Select the type of test	1	(Protections)
6. Select the test mode	2	(Manual)
7. Select the type of setting used to test the protections	2	(User setting)
8. Select the protection function to be tested	3	(I protection test)

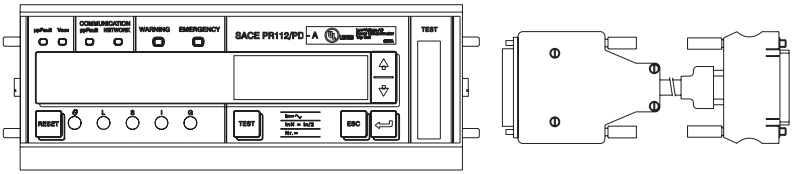
9. Using the arrow keys, fill in the page displayed as follows:

```
I-PROT: t=k,  ON
I3: 1.5In => 3000°
t3: Instantaneous
I-f: 2.00In => 4000 A(*)
```

(*) In this example, the automatically identified rating of the current sensor is 2000 A.

10. Select the phase (or phases) on which to simulate the fault current (L1+L2+L3)
11. Press ENTER to activate fault simulation

10. PR112/P-A and SACE PR112/PD-A protection release



10.1 Operation mode menu tree

1°	2°	3°	4°	5°	6°	7°	8°	9°
1. Operation mode	2. Select DUT (PR112-A)	1. Test	1.Protections	1.Automatic	Start test (select SET ELT)			Create report
				2. Manual	1. Default setting	Start test		
					2. User setting	Set parameters	Start test	
			2. I inst protection	Start test				
			3. Trip	Start test				
		2. Reading	1. Ammeter	Read currents				
			2. Config./Param.	1. DUT configur.	Display DUT configuration			
				2. DUT parameters	Display DUT protection parameters			
				3. Default parameters	1. Only for test	1. DUT configur.	Display DUT default configuration	
						2. DUT protection parameters	Display DUT default parameters	
					2. Operative	1. DUT configur.	Display DUT default configuration	
						2. DUT protection parameters	Display DUT default parameters	
			3. Information	Read release identification, SW version and Serial Number				
		3. Programming	1. Change DUT parameters	1. DUT configur.	Change DUT configuration parameters			
				2. DUT parameters	Change DUT configuration parameters			
			2. Default parameters	Program DUT with default parameters for normal operation				
			3. Define default parameters	1. Only for test	1. DUT configur.	Define DUT configuration parameters		
					2. DUT parameters	Define DUT protection parameters		
				2. Operative	1. DUT configur.	Define DUT configuration parameters		
					2. DUT parameters	Define DUT protection parameters		

10.2 Indications on operation

- The SACE PR010/T unit can be used with all PR112/P-A and PR112/ PD-A protection releases.
- The SACE PR112/PD-A releases must be connected to the auxiliary power supply for use with the SACE PR010/T unit.

NOTE: The PR112/P-A software release can be read on the display by choosing in sequence in READ mode, starting from the main menu:

- Config./Program
- Information

WARNING

Connect the test wire provided (between the SACE PR010/T and the SACE PR112) the right way round (see the adhesive labels on the connectors).

Manual test example for release PR112/P-A.

NOTE: the data indicating the type of CB and protection, the rated current of the CTs and the Neutral setting are automatically identified by the PR010/T test unit.

In this example, protection function "S" is tested with curve t=k, threshold I2=1.20*In, curve t2=0.4 s supplying a fault current equivalent to 2 times the rated current (In).

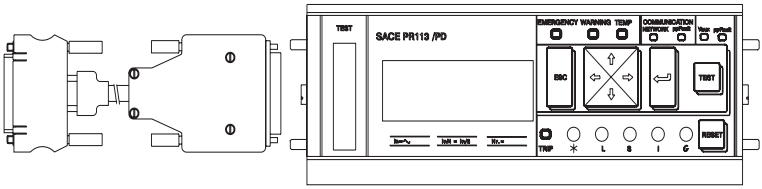
1. From the main menu select	1	(Operation mode)
2. Select the PR112-A unit with	x	(PR112-A)
3. Select the type of activity with	1	(Test)
4. Select the type of test with	1	(Protections)
5. Select the test mode with	2	(Manual)
6. Select the type of setting used to test the protections with	2	(User setting)
7. Select the protection function you want to test with	2	(S protection test)
8. Using the arrow keys, fill in the page displayed as follows:		

```
   S-PROT: t=k,  ON
S protection test: t=k
  L2: 1.2In => 2400 A
      T2: 0.4 s
I-f: 2.00 => 4000 A(*)
```

(*) In this example, the automatically identified rating of the current sensor is 2000 A. Check that I-F is lower than I3.

9. Select the phase (or phases) on which to simulate the fault current (L1+L2+L3)	
10. Press ENTER to activate fault simulation.	

11. SACE PR113/P and PR113/PD protection release



11.1 Operation mode menu tree

1°	2°	3°	4°	5°	6°	7°	8°	9°
1. Operation mode	2. Select DUT (PR113)	1. Test	1. Protections	1. Automatic	Start test			Create report
				2. Manual	1. Default setting	Start test		
					2. User setting	Set parameters	Start test	
			2. I inst protection	Start test				
			3. Trip	Start test				
		2. Reading	1. Currents	Read currents				
			2. Voltages	Read voltages				
			2. Powers	1. Active Power	Read active power			
				2. Reactive power	Read reactive power			
				3. Apparent power	Read apparent power			
			4. Energy counters	Read energy counters				
			5. Power factors	Read power factors				
			6. Freq./peak factor	Read Freq./peak factor				
			7. Last trip	Read last trip				
			8. Config./Param.	1. DUT configur.	Display DUT configuration			
				2. DUT parameters	1. Protection parameters	Read protection parameters		
					2. Other parameters	Read other parameters		
				3. Default parameters	1. For test	1. DUT configur.	Read config.	
						2. DUT parameters	Read param.	
					2 Operative	1. DUT configur.	Read config.	
						2. DUT parameters	Read param.	
			9. Information	Read release identification, SW version and Serial Number				

1°	2°	3°	4°	5°	6°	7°	8°	9°
1. Operation mode	2. Select DUT (PR113)	3. Programming	1. Change DUT config./ parameters	1. DUT config.	Change DUT configuration parameters			
				2. DUT param.	1. Protection parameters	Change DUT protection parameters		
					2. Other parameters	Change other parameters		
			2. Download def. parameters	Download				
			3. Def. parameters in PR010/T	1. For test	1. DUT config.	Change DUT configuration		
					2. DUT param.	1. Protection parameters	Change protect. par.	
				2. Operative	1. DUT config.	Change DUT configuration		
					2. DUT param.	1. Protection parameters	Change parameters	
						2. Other parameters	Change other parameters	

11.2 Indications on operation

- The SACE PR010/T unit can be used with all SACE PR113/P and SACE PR113/PD protection releases.
- The SACE PR113/PD releases must be connected to the auxiliary power supply for use with the SACE PR010/T unit.
- The tests must be carried out with the circuit breaker off, no voltage to the busbar (V=0) (where the VTs are installed to measure the SACE PR113/P and SACE PR113/PD release voltage) and the auxiliary power supply enabled.

WARNING

Connect the test wire provided (between the SACE PR010/T and the SACE PR113) the right way round (see the adhesive labels on the connectors).

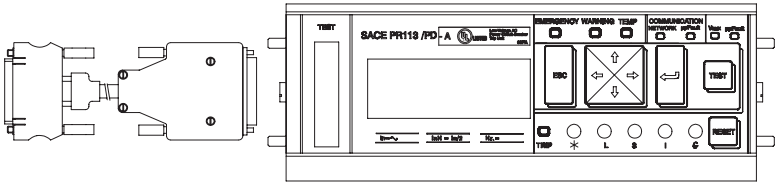
Example of an automatic test application on the PR113 release.

NOTE: the data on the CB and protection, on the current rating of the CTs and on the neutral setting are automatically identified by the PR010/T.

In this example, all the protection functions implemented by the SACE PR113/P and SACE PR113/PD release are tested automatically:

1. From the main menu select	1	(Operation mode)
2. Select the PR113 unit with	x	(PR113)
3. Select the type of activity with	1	(Test)
4. Select the type of test with	1	(Protections)
5. Select the test mode with	1	(Automatic)
6. Pressing ENTER enables a simulation of the failure for each protection function.		

12. SACE PR113/P-A and PR113/PD-A protection release



12.1 Operation mode menu tree

1°	2°	3°	4°	5°	6°	7°	8°	9°
1. Operation mode	2. Select DUT (PR113-A)	1. Test	1.Protections	1.Automatic	Start test			Create report
				2. Manual	1. Default setting	Start test		
					2. User setting	Set parameters	Start test	
			2. I inst protection	Start test				
			3. Trip	Start test				
		2. Reading	1. Currents	Read currents				
			2. Voltages	Read voltages				
			3. Powers	1. Active Power	Read active power			
				2. Reactive power	Read reactive power			
				3. Apparent power	Read apparent power			
			4. Energy counters	Read energy counters				
			5. Power factors	Read power factors				
			6. Freq./peak factor	Read Freq./peak factor				
			7. Last trip	Read last trip				
			8. Configuration/ param.	1. DUT configur.	Display DUT configuration			
				2. DUT parameters	1.Protection parameters	Read protection parameters		
					2. Other parameters	Read other parameters		
				3. Default parameters	1. For test	1. DUT config.	Read config.	
						2. DUT param.	Read param.	
					2 Operative	1. DUT config.	Read config.	
						2. DUT param.	Read param.	
			9. Information	Read release identification, SW version and Serial Number				

1°	2°	3°	4°	5°	6°	7°	8°	9°
1. Operation mode	2. Select DUT (PR113-A)	3. Programming	1. Change DUT config./ parameters	1. DUT config.	Change DUT configuration parameters			
				2. DUT param.	1. Protection parameters	Change DUT protection parameters		
					2. Other parameters	Change other parameters		
			2. Download def. parameters	Download				
			3. Def. parameters in PR010/T	1. For test	1. DUT config.	Change DUT configuration		
					2. DUT param.	1. Protection parameters	Change protect. par.	
				2. Operative	1. DUT config.	Change DUT configuration		
					2. DUT param.	1. Protection parameters	Change parameters	
						2. Other parameters	Change other parameters	

12.2 Indications on operation

- The SACE PR010/T unit can be used with all SACE PR113/P-A and SACE PR113/PD-A protection releases.
- The SACE PR113/PD-A releases must be connected to the auxiliary power supply for use with the SACE PR010/T unit.
- The tests must be carried out with the circuit breaker off, no voltage to the busbar (V=0) (where the VTs are installed to measure the SACE PR113/P-A and SACE PR113/PD-A release voltage) and the auxiliary power supply enabled.

WARNING

Connect the test wire provided (between the SACE PR010/T and the SACE PR113) the right way round (see the adhesive labels on the connectors).

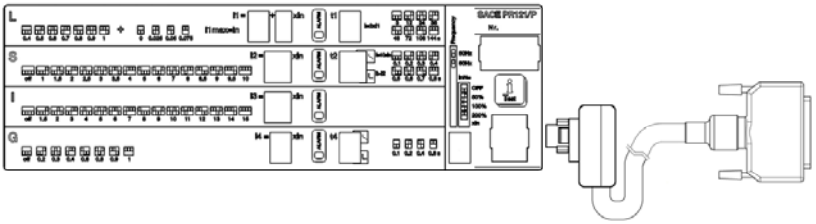
Example of an automatic test application on the PR113 release

NOTE: the data on the CB and protection, on the current rating of the CTs and on the neutral setting are automatically identified by the PR010/T.

In this example, all the protection functions implemented by the SACE SACE PR113/P-A and SACE PR113/PD-A release are tested automatically:

1. From the main menu select	1	(Operation mode)
2. Select the PR113 unit with	x	(PR113 A)
3. Select the type of activity with	1	(Test)
4. Select the type of test with	1	(Protections)
5. Select the test mode with	1	(Automatic)
6. Pressing ENTER enables a simulation of the failure for each protection function		

13. SACE PR121/P protection release



13.1 Operation mode menu tree

PR121 UNIT	1. Test 2. Measurements 3. History 4. Config/Param 5. Information 6. Status

1. Test

1. Start automatic test — Test report
2. Start manual test — Test report
3. Start trip test

2. Measurements

1. Display currents
2. Display peak factors

3. History

1. Trip History display
2. Events display
3. Statistics
   1. Display contact wear
   2. Display total no. prot. trips
   3. Display no. manual oper.
   4. Display no. prot. oper.
   5. Display no. trip failures
   6. Display no. trip tests

PR121 UNIT	1. Test 2. Measurements 3. History 4. Config/Param 5. Information 6. Status

4. Config/Param

1. Configurations
   1. Circuit breaker
      1. Display neutral protection
      2. Display plant config.
      3. Display CB TAG Name
      4. Display User Data
   2. Display mains frequency
   3. Local bus unit
      1. Local bus unit presence
      2. Release 1 configuration
      3. Release 2 configuration
      4. Release 3 configuration
      5. Release 4 configuration
      6. Release 6 configuration
      7. Release 7 configuration
      8. Release 8 configuration
         1. Type of signal source — Display custom. type
         2. Display source configuration
      3. Release 2 configuration
      4. Release 3 configuration
      5. Release 4 configuration
      6. Release 6 configuration
      7. Release 7 configuration
      8. Release 8 configuration
   2. Protection parameters
      1. Protection L parameters
      2. Protection S parameters
      3. Protection I parameters
      4. Protection G parameters

5. Information

1. Protection unit information
2. Circuit breaker information

6. Status

1. Display configuration error

13.2 Indications on operation

- The SACE PR010/T test unit can be used with all SACE PR121/P releases by connecting the test unit to the protection unit with the cable provided, to be inserted in the test connector on the front.
- It is not necessary for the auxiliary supply to be present in order to use the above releases with the PR010/T unit.
- The automatic and manual tests must be performed with the circuit breaker off while the trip test may be performed only with the circuit breaker on; in either case the circulating currents must be null.

WARNING

For PR121/P releases with a version prior to 1.0, the following limitations must be considered:

1. Startup time protection S:	0.1 ≤ Time ≤ 1.5 s step 0.01 s
2. Startup time protection S2:	0.1 ≤ Time ≤ 1.5 s step 0.01 s
3. Startup time protection G:	0.1 ≤ Time ≤ 1.5 s step 0.01 s
4. Startup time protection Gext:	0.1 ≤ Time ≤ 1.5 s step 0.01 s
5. Startup time protection D:	0.1 ≤ Time ≤ 1.5 s step 0.01 s
6. Startup current activation threshold not contemplated	
7. Protection U threshold:	5% ≤ th ≤ 90% step 5%
8. Management of unit contacts on local bus not contemplated.	

A description of the various menus is given below.

13.3 Test

By means of the PR010/T unit it is possible to perform some tests on the protection unit, in particular:

1. Automatic test
2. Manual test
3. Trip test

For example, to perform the automatic test it is necessary to follow the procedure described in the following table:

Key to be pressed	Item selected
1	Operation mode
x	PR121/P
1	Test
1	Automatic test
ENTER	

A brief description of the various tests will be given below.

13.3.1 Automatic test of the release PR121/P

With the automatic test, a sequence of 7 different tests will be performed at the currents and phases indicated in the following table.

Test N°	Phase			Value
	L1	L2	L3	
1	■	■	■	0.3 In
2	■	■	■	3.0 In
3	■	■	■	5.0 In
4	■	■	■	10.0 In
5	■	■	■	15.0 In
6	■			0.3 In
7	■			3.0 In

The trip times of the release in the various tests will depend on the settings of the protections; on the display the PR010/T unit will show the trip time and the result of the test (OK;FAILED).

At the end of the test it is asked whether to record a test report which may later be downloaded on a PC.

13.3.2 Manual Test

The manual test allows testing of the release trip time with the desired load condition, in particular it offers the possibility of selecting the current value in a range between 0.00 and 16.00 In and of selecting the phases involved in the test (L1, L2, L3, Ne, Gext).

The release trip time will depend on the settings of the protections; on the display the PR010/T unit will show the trip time and the result of the test (OK, FAILED).

At the end of the test it is asked whether to record a test report which may later be downloaded on a PC.

13.3.3 Trip test

With this test it is possible to send a command to turn off the circuit breaker, thus checking the functionality of the protection opening system.

The trip test command is accepted by the protection unit only if the circuit breaker is on.

13.4 Measurements

It is possible to display the measures of the circulating currents and of the peak factors.

For example to display the current measurements, the following selections must be made:

Key to be pressed	Item selected
1	Operation mode
x	PR121/P
2	Measurements
1	Currents
ENTER	

13.5 History

Under the history menu is the display of the history for the openings of the protection tripped, the events and some statistical information on the openings of the release.

For example to display the history of the openings (trip history), the following selections must be made:

Key to be pressed	Item selected
1	Operation mode
x	PR121/P
3	History
1	Trip history
ENTER	

13.6 Configurations/parameters

It is possible to display and even modify the configurations and parameters of the release.

13.6.1 Configurations

The available configuration parameters are divided into the following sub-sets:

1. Circuit breaker
2. Mains frequency
3. Local bus unit

For example, starting from the main menu, selecting:

Key to be pressed	Item selected
1	Operation mode
x	PR121/P
4	Config./Parameters
1	Configurations
1	Circuit breaker
1	Neutral protection
ENTER	

enters the screen that displays the configuration parameters of the neutral protection and the following screen appears:

```
Neutral protection

Enable: ON[OFF]
Threshold: 50 [...]%
```

Pressing the ENTER key launches editing mode (the cursor starts blinking); the buttons ↑ and ↓ are used to position the cursor on the desired parameter and the buttons ← and → to change the value of the parameters in the allowed range.

13.6.1.1 Local bus unit

From the CONFIGURATIONS menu it is possible to set the parameters for operation of the release unit on the local bus, selecting:

Key to be pressed	Item selected
1	Operation mode
x	PR121/P
4	Config./Parameters
1	Configurations
3	Circuit breaker
...	Local bus unit

At this point it is possible to choose one of the following items:

1. Presence
2. Release 1
3. Release 2
4. Release 3
5. Release 4
6. Release 6
7. Release 7
8. Release 8

Selecting "Presence" sets the presence/absence of a unit on the local bus.

Selecting Release x the configuration parameters of release x on the local bus unit are read/set, for example selecting:

Key to be pressed	Item selected
...	...
4	Release 3
1	Source

The setting of the activation signal of release no. 3 is displayed; pressing the ENTER key launches editing mode (the cursor starts blinking); the setting of the activation signal is changed using the keys ← and →.

If "Custom" is selected, when ENTER is pressed the current setting is displayed, for example:

```
  ALARM 1 4...6
→ L Pre-alarm
   L Timing
→ S Timing
```

Where the arrows indicate which elements of the ALARM 1 block are selected.

The buttons ↑ and ↓ are used to display the previous/next screen and the buttons ← and → to activate/deactivate the selected element (the arrow next to the element is shown/removed)

There are 18 blocks, each of which is made up of eight elements and is displayed in three consecutive screens; up to 8 elements may be activated for each block.

On the last screen of each block it is possible to define the AND/OR logic applied to the selected elements and the minimum release activation time.

13.6.2 Parameters

The protection parameters are divided into:

1. L protection
2. S protection
3. I protection
4. G protection

For example, selecting:

Key to be pressed	Item selected
1	Operation mode
x	PR121/P
4	Config./Parameters
2	Parameters
1	Protection L
ENTER	

enters the screen that displays the parameters of protection L and the following screen appears:

```
L prot   t=k/i2 [...]
Threshold:  x.xx In
Time:   x.xx s
Thermal mem: ON [OFF]
```

Pressing the ENTER key launches editing mode (the cursor starts blinking); the buttons ↑ and ↓ are used to position the cursor on the desired parameter and the buttons ← and → to change the value of the parameters in the allowed range.

13.7 Information

On this menu it is possible to view some information on the protection unit and the circuit breaker.

The menu is divided into:

1. Protection unit
2. Circuit breaker

For example, starting from the main menu, selecting:

Key to be pressed	Item selected
1	Operation mode
x	PR121/P
5	Information
2	Circuit breaker
ENTER	

enters the screen that displays information on the circuit breaker:

```
Device: E1B800/4P
Rated Current: xxxxA
```

```
sn: xxxxxxxxxxxxxxx
```

Pressing the keys ↑ and ↓ passes to the display of the next/previous screen:

```
Install: xx/xx/xxxx
Maint: xx/xx/xxxx
```

13.8 Status

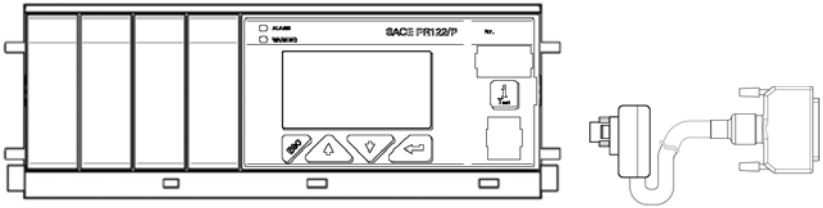
On this menu it is possible to view any signals of an error in configuration/wiring of the protection unit and of the circuit breaker. In particular, one or more of the following messages may be displayed:

1. No alarm
2. L Prealarm
3. T Prealarm
4. L1 Sensor error
5. L2 Sensor error
6. L3 Sensor error
7. Ne Sensor error

8. Gext sensor error
9. TC disconnected
10. Rating Plug error
11. Installation error
12. Device error
13. Invalid Date
14. Configuration error
15. CB status error

Refer to the release user manual for the solution of the errors indicated.

14. SACE PR122/P protection release



14.1 Operation mode menu tree

PR122 UNIT

1. **Test**
2. **Measurements**
3. **History**
4. **Config/Param**
5. **Information**
6. **Status**

1. Test

1. Start automatic test — Test report
2. Start manual test — Test report
3. Start trip test
4. Start signalling module autotest
5. Force output S zone sel.
6. Force output G zone sel.
7. Release output zone sel.
8. Start Rc test — note 1

2. Measurements

1. Display currents
2. Display peak factors
3. Display voltages
4. POWERS
   1. Display active power
   2. Display reactive power
   3. Display apparent power
5. Display energies
6. Display power factor
7. Display measured frequency
8. Reset energies counters
9. Reset measurement history

note 2

3. History

1. Display trip history
2. Display events
3. Statistics
   1. Display contact wear
   2. Display total no. prot. trips
   3. Display total no. prot. trips
   4. Display no. manual operations
   5. Display no. prot. operations
   6. Display no. trip failures
   7. Display no. trip tests

4. Config/Param

1. CONFIGURATIONS >>
2. PARAMETERS >>

5. Information

1. Protection unit information
2. Circuit breaker information

6. Status

1. Display configuration error

PR122 UNIT CONFIGURATIONS	1. Circuit breaker 2. Mains freq. 3. Meas. int. 4. Local bus an. Th. 5. Startup curr. Th.	6. Harmonic distortion 7. Modules 8. Local bus unit 9. Data logger 10.System

1. Circuit breaker

1. Neutral protection parameters
2. Ground toroide protection parameters — note 1
3. Plant config. parameters
4. CB TAG Name
5. User Data

2. Mains frequency

3. Measurement storage period

4. Local Bus analogue threshold

5. Startup current activation threshold

6. Enable/disable harmonic distortion alarm

7. Modules

1. Measuring — note 2
   1. Voltage transformer parameters
   2. Neutral voltage presence
   3. Positive power direction
2. Communication — note 3
   1. Operation mode
   2. Communication parameters
3. Signalling module — note 4
   1. Release 1 configuration
      1. Type of signal source — Display custom. type
      2. Display source configuration
   2. Release 2 configuration
   3. Release 3 configuration
   4. Release 4 configuration
   5. Input — (signalling module configuration)

8. Local bus unit

1. Local bus unit presence
2. Release configuration
   1. Type of signal source — Display custom. type
   2. Display source configuration
3. Release 2 configuration
4. Release 3 configuration
5. Release 4 configuration
6. Release 6 configuration
7. Release 7 configuration
8. Release 8 configuration

9. Data logger

1. Data logger configuration
2. Stop data logger event — Display custom. type
3. Reset data logger
4. Stop data logger

10. System

1. Display clock
2. Set language

PR122 UNIT Protection parameters	1. L prot. 2. S prot. 3. I prot. 4. G prot. 5. Ext G prot. 6. U prot.	7. T prot. 8. LC1 prot. 9. LC2 prot. 10. Iw prot. 11. Rc prot. 12. MCR prot.	13. UV prot. 14. OV prot. 15. RV prot. 16. RP prot. 17. UF prot. 18. OF prot.	
1.	Protection L parameters			
2.	Protection S parameters			note 5
3.	Protection I parameters			
4.	Protection G parameters			note 6
5.	Protection Ext G parameters			note 6
6.	Protection U parameters			
7.	Protection T parameters			
8.	Protection LC1 parameters			
9.	Protection LC2 parameters			
10.	Protection Iw parameters			
11.	Protection Rc parameters			note 1
12.	Protection MCR parameters			
13.	Protection UV parameters			note 2
14.	Protection OV parameters			note 2
15.	Protection RV parameters			note 2
16.	Protection RP parameters			note 2
17.	Protection UF parameters			note 2
18.	Protection OF parameters			note 2

NOTES

1. Only for performing LSIG (with measuring module) or LSIRc and presence of residual current in the external toroide.
2. Only if measuring module present.
3. Only if communication module present.
4. Only if signalling module present.
5. Only for performing LSI or LSIG or LSIRc.
6. Only for performing LSIG.

14.2 Indications on operation

- The SACE PR010/T unit may be used with all SACE PR122/P releases connecting the test unit to the protection unit by means of a special cable to the functional test connector.

- It is not necessary for the auxiliary supply to be present in order to use the above releases with the PR010/T unit.
- The automatic and manual tests must be performed with the circuit breaker off while the trip test may be performed only with the circuit breaker on; in either case the circulating currents must be null.

WARNING

For PR122/P releases with a software version prior to 1.0, the following limitations must be considered:

1. Startup time protection S:	0.1 s ≤ Time ≤ 1.5 s step 0.01 s
2. Startup time protection S2:	0.1 s ≤ Time ≤ 1.5 s step 0.01 s
3. Startup time protection G:	0.1 s ≤ Time ≤ 1.5 s step 0.01 s
4. Startup time protection Gext:	0.1 s ≤ Time ≤ 1.5 s step 0.01 s
5. Startup time protection D:	0.1 s ≤ Time ≤ 1.5 s step 0.01 s
6. Startup current activation threshold not contemplated	
7. Protection U threshold:	5% ≤ th ≤ 90% step 5%
8. Management of unit contacts on local bus not contemplated.	

A description of the various menus is given below.

14.3 Test

By means of the PR010/T unit it is possible to perform some tests on the protection unit, in particular:

1. Automatic test
2. Manual test
3. Trip test
4. Sign. mod. autotest
5. Force output S ZS
6. Force output G ZS
7. Release output ZS
8. Rc Test

For example, to perform the automatic test it is necessary to follow the procedure described in the following table:

Key to be pressed	Item selected
1	Operation mode
x	PR122/P
1	Test
1	Automatic test
ENTER	

A brief description of the various tests will be given below.

14.3.1 Automatic test of the release PR122/P

- In the absence of the PR120/V measuring module:

with the automatic test, a sequence of 7 different tests will be performed at the currents and phases indicated in the following table:

Test N°	Phase			Value
	L1	L2	L3	
1	■	■	■	0.3 In
2	■	■	■	3.0 In
3	■	■	■	5.0 In
4	■	■	■	10.0 In
5	■	■	■	15.0 In
6	■			0.3 In
7	■			3.0 In

- In the presence of the PR120/V measuring module:

with the automatic test, a sequence of 13 different tests will be performed at the currents, voltages, phase shift and phases indicated in the following table:

Test N°	Phase						Amplitude		Phase shift
	L1	L2	L3	V12	V23	V31	I [In]	V[Un]	Φ
1	■	■	■	■	■	■	3.0	1.0	30°
2	■	■	■	■	■	■	5.0		
3	■	■	■	■	■	■	10		
4	■	■	■	■	■	■	15		
5	■			■	■	■	0.3	1.0	0°
6	■			■	■	■	3.0		
7	■	■	■	■	■	■	0.3	1.0	210°
8	■	■	■	■	■	■	3.0		
9	■	■	■	■	■	■	5.0		
10	■	■	■	■	■	■	10		
11	■	■	■	■	■	■	15		
12				■	■	■	0.0	0.4	---
13				■	■	■		1.3	

For example test n° 5 is performed with:

IL = 0.3 In

IL2 = IL3 = 0 In

V12=V23=V31=1 Un

Phase shift 0° (cosΦ=1)

The trip times of the release in the various tests will depend on the settings of the protections; on the display the PR010/T unit will show the trip time and the result of the test (OK/FAILED).

At the end of the test it is asked whether to record a test report which may later be downloaded on a PC.

14.3.2 Manual Test

The manual test allows the release trip time to be tested with the desired load condition, in particular it offers the possibility of selecting the current value in a range between 0.00 and 16.00 In, the voltage value in a range between 0.0 and 1.3 Un, the phase shift between -180° and +180° with step 0.75°, and of selecting the phases involved in the test (L1, L2, L3, Ne, Gext, V1, V2, V3).

The release trip time will depend on the settings of the protections; on the display the PR010/T unit will show the trip time and the result of the test (OK, FAILED).

At the end of the test it is asked whether to record a test report which may later be downloaded on a PC.

14.3.3 Trip test

With this test it is possible to send a command to turn off the circuit breaker, thus checking the functionality of the protection opening system.

The trip test command is accepted by the protection unit only if the circuit breaker is on.

14.3.4 Sign. mod. autotest

When this item is selected, the autotest of the signalling module is launched. Refer to the signalling module manual for further information on this function.

14.3.5 Force output S ZS

Activates the zone selectivity output of the protection S; this command allows checking of the zone selectivity function on the system.

14.3.6 Force output G ZS

Activates the zone selectivity output of the protection G; this command allows checking of the zone selectivity function on the system.

14.3.7 Release output ZS

Deactivates both the zone selectivity outputs of the protections S and G; this command allows checking of the zone selectivity function on the system.

14.3.8 RC Test

Activates the test of the protection RC. Refer to the protection manual for further information on this function.

14.4 Measurements

It is possible to display the following measurements:

1. Currents
2. Peak factors
3. Voltages
4. Powers
5. Energies
6. Power factor
7. Frequency
8. Reset energies
9. Reset meas. history

For example to display the current measurements, the following selections must be made:

Key to be pressed	Item selected
1	Operation mode
x	PR122/P
2	Measurements
1	Currents
ENTER	

14.5 History

Under the HISTORY menu is the display of the history for the openings of the protection tripped, the events and some statistical information on the openings of the release.

For example to display the history of the openings (trip history), the following selections must be made:

Key to be pressed	Item selected
1	Operation mode
x	PR122/P
3	History
1	Trip history
ENTER	

14.6 Configurations/parameters

It is possible to display and even modify the configurations and parameters of the release.

14.6.1 Configurations

The configuration parameters available are divided into:

1. Circuit breaker
2. Mains frequency
3. Meas. int. (Measurement interval)
4. Local bus an. Th. (Local bus analog threshold)
5. Startup curr. Th. (startup current threshold)
6. Harmonic distortion
7. Modules
8. Local bus unit
9. Data logger
10. System

For example, starting from the main menu, selecting:

Key to be pressed	Item selected
1	Operation mode
x	PR122/P
4	Config./Parameters
1	Configurations
1	Circuit breaker
1	Neutral protection
ENTER	

enters the screen that displays the configuration parameters of the neutral protection and the following screen appears:

```
Neutral protection

Enable: ON [OFF]
Threshold: 50 [...]%
```

Pressing the ENTER key launches editing mode (the cursor starts blinking); using the keys ↑ and ↓ the cursor is positioned on the desired parameter and the keys ← and → are used to modify the value of the parameters in the allowed range.

14.6.2 Local bus unit

From the CONFIGURATIONS menu it is possible to set the parameters for operation of the release unit on the local bus, selecting:

Key to be pressed	Item selected
1	Operation mode
x	PR121/P
4	Config./Parameters
1	Configurations
3	Local bus unit
...	...

At this point it is possible to choose one of the following items:

1. Presence
2. Release 1
3. Release 2
4. Release 3
5. Release 4
6. Release 6
7. Release 7
8. Release 8

Selecting "Presence" sets the presence/absence of a unit on the local bus.

Selecting Release x the configuration parameters of release x on the local bus unit are read/set, for example selecting:

Key to be pressed	Item selected
...	...
4	Release 3
1	Source

The setting of the activation signal of release no. 3 is displayed; pressing the ENTER key launches editing mode (the cursor starts blinking); the setting of the activation signal is changed using the keys ← and →.

If "Custom" is selected, when ENTER is pressed the current setting is displayed, for example:

```
  ALARM 1 4...6
→ L Pre-alarm
  L Timing
→ S Timing
```

Where the arrows indicate which elements of the ALARM 1 block are selected.

With the keys ↑ and ↓ the previous/next screen is displayed and with the keys ← and → the selected element is activated/deactivated (the arrow next to the element is displayed/removed).

There are 18 blocks, each of which is made up of eight elements and is displayed in three consecutive screens; up to 8 elements may be activated for each block.

On the last screen of each block it is possible to define the AND/OR logic applied to the selected elements and the minimum release activation time.

14.6.3 Parameters

The protection parameters are divided into:

1. L prot.
2. S prot.
3. I prot.
4. G prot.
5. Ext G prot.
6. U prot.
7. T prot.
8. LC1 prot.
9. LC2 prot.
10. Iw prot.
11. RC prot.
12. MCR prot.
13. UV prot.
14. OV prot.
15. RV prot.
16. RP prot.
17. UF prot.
18. OF prot.

For example, selecting:

Key to be pressed	Item selected
1	Operation mode
x	PR122/P
4	Config./Parameters
2	Parameters
1	Protection L
ENTER	

enters the screen that displays the parameters of protection L and the following screen appears:

```
L prot   t=k/i2 [...]
Threshold:  x.xx In
Time:   x.xx s
Thermal mem: ON [OFF]
```

Pressing the ENTER key launches editing mode (the cursor starts blinking); using the keys ↑ and↓ the cursor is positioned on the desired parameter and the keys ← and → are used to modify the value of the parameters in the allowed range.

14.7 Information

On this menu it is possible to view some information on the protection unit and the circuit breaker.

The menu is divided into:

1. Protection unit
2. Circuit breaker

For example, starting from the main menu, selecting:

Key to be pressed	Item selected
1	Operation mode
x	PR122/P 3
5	Information
2	Circuit breaker
ENTER	

enters the screen that displays information on the circuit breaker:

```
Device: E1B800/4P
Rated Current: xxxxA

sn: xxxxxxxxxxxxxxxx
```

Pressing the keys ↑ and ↓ passes to the display of the next/previous screen:

```
Install: xx/xx/xxxx
Maint: xx/xx/xxxx
```

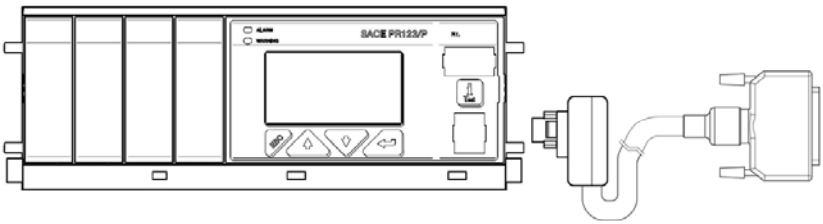
14.8 Status

On this menu it is possible to view any signals of an error in configuration/wiring of the protection unit and of the circuit breaker. In particular, one or more of the following messages may be displayed:

1. No alarm
2. L Prealarm
3. T Prealarm
4. L1 Sensor error
5. L2 Sensor error
6. L3 Sensor error
7. Ne Sensor error
8. Gext sensor error
9. TC disconnected
10. Rating Plug error
11. Installation error
12. Device error
13. Invalid Date
14. Configuration error
15. CB status error

Refer to the release user manual for the solution of the errors indicated.

15. SACE PR123/P protection release



15.1 Operation mode menu tree

PR123 UNIT

1. **Test**
2. **Measurements**
3. **History**
4. **Config/Param**
5. **Information**
6. **Status**

1. Test

1. Start automatic test — Test report
2. Start manual test — Test report
3. Start trip test
4. Start signalling module autotest
5. Force output S zone sel.
6. Force output G zone sel.
7. Release output zone sel.
8. Start Rc test — note 1

2. Measurements

1. Display currents
2. Display peak factors
3. Display voltages
4. POWERS
   1. Display active power
   2. Display reactive power
   3. Display apparent power
5. Display energies
6. Display power factor
7. Display measured frequency
8. Reset energies counters
9. Reset measurement history

3. History

1. Display trip history
2. Display events
3. Statistics
   1. Display contact wear
   2. Display total no. prot. trips
   3. Display total no. prot. trips
   4. Display no. manual operations
   5. Display no. prot. operations
   6. Display no. trip failures
   7. Display no. trip tests

4. Config/Param

1. CONFIGURATIONS >>
2. Protection parameters
   1. Set A PARAMETERS >>
   2. Set B PARAMETERS >>

5. Information

1. Protection unit information
2. Circuit breaker information

6. Status

1. Display configuration error

PR123 UNIT CONFIGURATIONS

1. Circuit breaker
2. Mains freq.
3. Meas. int.
4. Local bus an. Th.
5. Startup curr. Th.
6. Dual setting
7. Harmonic distortion
8. Modules
9. Local bus unit
10. Data logger
11. System

1. Circuit breaker

1. Neutral protection parameters
2. Ground toroide protection parameters — note 5
3. Plant config. parameters
4. CB TAG Name
5. User Data

2. Mains frequency

3. Measurement storage period

4. Local Bus analogue threshold

5. Startup current activation threshold

6. Dual setting

1. Enable dual setting
2. Default setting
3. Dual setting on CB close
4. Dual setting on Vaux Off
5. Set B on L Bus DI

7. Enable/disable harmonic distortion alarm

8. Modules

1. Measuring
   1. Voltage transformer parameters
   2. Neutral voltage presence
   3. Positive power direction
   4. Warnings
      1. Phase sequence configuration
      2. Power factor configuration
2. Communication — note 3
   1. Operation mode
   2. Communication parameters
3. Signalling module — note 4
   1. Release 1 configuration
      1. Type of signal source — Display custom. type
      2. Display source configuration
   2. Release 2 configuration
   3. Release 3 configuration
   4. Release 4 configuration
   5. Input — (signalling module configuration)

9. Local bus unit

1. Local bus unit presence
2. Release 1 configuration
   1. Type of signal source — Display custom. type
   2. Display source configuration
3. Release 2 configuration
4. Release 3 configuration
5. Release 4 configuration
6. Release 6 configuration
7. Release 7 configuration

PR123 UNIT CONFIGURATIONS	1. Circuit breaker 2. Mains freq. 3. Meas. int. 4. Local bus an. Th. 5. Startup curr. Th. 6. Dual setting	7. Harmonic distortion 8. Modules 9. Local bus unit 10. Data logger 11. System

8. Release 8 configuration

10. Data logger

1. Data logger configuration
2. Stop data logger event — Display custom. type
3. Reset data logger
4. Stop data logger

11. System

1. Display clock
2. Set language

PR123 UNIT Protection parameters	1. L prot. 2. S prot. 3. S2 prot. 4. D prot. 5. I prot. 6. G prot. 7. Ext G prot.	8. U prot. 9. T prot. 10. LC1 prot. 11. LC2 prot. 12. Iw prot. 13. Rc prot. 14. MCR prot.	15. UV prot. 16. OV prot. 17. RV prot. 18. RP prot. 19. UF prot. 20. OF prot.

1. Protection L parameters	
2. Protection S parameters	
3. Protection S2 parameters	
4. Protection D parameters	
5. Protection I parameters	
6. Protection G parameters	note 5
7. Protection Ext G parameters	note 5
8. Protection U parameters	
9. Protection T parameters	
10. Protection LC1 parameters	
11. Protection LC2 parameters	
12. Protection Iw parameters	
13. Protection Rc parameters	note 1
14. Protection MCR parameters	
15. Protection UV parameters	
16. Protection OV parameters	
17. Protection RV parameters	
18. Protection RP parameters	
19. Protection UF parameters	
20. Protection OF parameters	

NOTES

1. Only for performing LSIG and presence of residual current in the external toroide.
2. Only if measuring module present.
3. Only if communication module present.
4. Only if signalling module present.
5. Only for performing LSIG.

15.2 Indications on operation

- The SACE PR010/T unit can be used with all SACE PR123/P releases by connecting the test unit to the protection unit with the cable provided, to be inserted in the test connector on the front.
- It is not necessary for the auxiliary supply to be present in order to use the above releases with the PR010/T unit.
- The automatic and manual tests must be performed with the circuit breaker off while the trip test may be performed only with the circuit breaker on; in either case the circulating currents must be null.

WARNING

For PR123/P releases with a software version prior to 1.0, the following limitations must be considered:

1. Startup time protection S:	0.1 s ≤ Time ≤ 1.5 s step 0.01 s
2. Startup time protection S2:	0.1 s ≤ Time ≤ 1.5 s step 0.01 s
3. Startup time protection G:	0.1 s ≤ Time ≤ 1.5 s step 0.01 s
4. Startup time protection Gext:	0.1 s ≤ Time ≤ 1.5 s step 0.01 s
5. Startup time protection D:	0.1 s ≤ Time ≤ 1.5 s step 0.01 s
6. Startup current activation threshold not contemplated	
7. Protection U threshold:	5% ≤ th ≤ 90% step 5%
8. Minimum custom datalogger activation time not contemplated	

A description of the various menus is given below.

15.3 Test

By means of the PR010/T unit it is possible to perform some tests on the protection unit, in particular:

1. Automatic test
2. Manual test
3. Trip test
4. Sign. mod. autotest
5. Force output S ZS
6. Force output G ZS

7. Release output ZS
8. Rc Test

For example, to perform the automatic test it is necessary to follow the procedure described in the following table:

Key to be pressed	Item selected
1	Operation mode
x	PR123/P
1	Test
1	Automatic test
ENTER	

A brief description of the various tests will be given below.

15.3.1 Automatic test of the release PR123/P

With the automatic test, a sequence of 13 different tests will be performed at the currents, voltages, phase shift and phases indicated in the following table:

Test N°	Phase						Amplitude		Phase shift
	L1	L2	L3	V12	V23	V31	I [In]	V[Un]	Φ
1	■	■	■	■	■	■	3.0	1	30°
2	■	■	■	■	■	■	5.0		
3	■	■	■	■	■	■	10		
4	■	■	■	■	■	■	15		
5	■			■	■	■	0.3	1	0°
6	■			■	■	■	3		
7	■	■	■	■	■	■	0.3	1	210°
8	■	■	■	■	■	■	3		
9	■	■	■	■	■	■	5		
10	■	■	■	■	■	■	10		
11	■	■	■	■	■	■	15		
12				■	■	■	0.0	0.4	
13				■	■	■		1.3	

For example test n° 5 is performed with:

IL1=0,3 In

IL2=IL3= 0 In

V12=V23=V31= 1 Un

Phase shift 0° (cosΦ=1)

The trip times of the release in the various tests will depend on the settings of the protections; on the display the PR010/T unit will show the trip time and the result of the test (OK/FAILED).

At the end of the test it is asked whether to record a test report which may later be downloaded on a PC.

15.3.2 Manual test

The manual test allows the release trip time to be tested with the desired load condition, in particular it offers the possibility of selecting the current value in a range between 0.00 and 16.00 In, the voltage value in a range between 0.0 and 1.3 Un, the phase shift between -180° and +180° with step 0.75°, and of selecting the phases involved in the test (L1, L2, L3, Ne, Gext, V1, V2, V3).

The release trip time will depend on the settings of the protections; on the display the PR010/T unit will show the trip time and the result of the test (OK, FAILED).

At the end of the test it is asked whether to record a test report which may later be downloaded on a PC.

15.3.3 Trip test

With this test it is possible to send a command to turn off the circuit breaker, thus checking the functionality of the protection opening system.

The trip test command is accepted by the protection unit only if the circuit breaker is on.

15.3.4 Sign. mod. autotest

When this item is selected, the autotest of the signalling module is launched. Refer to the signalling module manual for further information on this function.

15.3.5 Force output S ZS

Activates the zone selectivity output of the protection S; this command allows checking of the zone selectivity function on the system.

15.3.6 Force output G ZS

Activates the zone selectivity output of protection G; this command allows checking of the zone selectivity function on the system.

15.3.7 Release output ZS

Deactivates both the zone selectivity outputs of the protections S and G; this command allows checking of the zone selectivity function on the system.

15.3.8 RC Test

Activates the test of the protection RC. Refer to the protection manual for further information on this function.

15.4 Measurements

It is possible to display the following measurements:

1. Currents
2. Peak factors
3. Voltages
4. Powers
5. Energies
6. Power factor
7. Frequency
8. Reset energies
9. Reset meas. history

For example to display the current measurements, the following selections must be made:

Key to be pressed	Item selected
1	Operation mode
x	PR123/P
2	Measurements
1	Currents
ENTER	

15.5 History

Under the history menu is the display of the history for the openings of the protection tripped, the events and some statistical information on the openings of the release.

For example to display the history of the openings (trip history), the following selections must be made:

Key to be pressed	Item selected
1	Operation mode
x	PR123/P
3	History
1	Trip history
ENTER	

15.6 Configurations/parameters

It is possible to display and even modify the configurations and parameters of the release.

15.6.1 Configurations

The configuration parameters available are divided into:

1. Circuit breaker
2. Mains freq.
3. Meas. int. (Measurement interval)
4. Local bus an. Th. (Local bus analog threshold)
5. Startup curr. Th. (startup current threshold)
6. Dual setting
7. Harmonic distortion
8. Modules
9. Local bus unit
10. Data logger
11. System

For example, starting from the main menu, selecting:

Key to be pressed	Item selected
1	Operation mode
x	PR123/P
4	Config./Parameters
1	Configurations
1	Circuit breaker
1	Neutral protection
ENTER	

enters the screen that displays the configuration parameters of the neutral protection and the following screen appears:

```
Neutral protection

Enable: ON [OFF]
Threshold: 50[...]%
```

Pressing the ENTER key launches editing mode (the cursor starts blinking); using the keys ↑ and ↓ the cursor is positioned on the desired parameter and the keys ← and → are used to modify the value of the parameters in the allowed range.

15.6.1.1 Local bus unit

From the CONFIGURATIONS menu it is possible to set the parameters for operation of the release unit on the local bus, selecting:

Key to be pressed	Item selected
1	Operation mode
x	PR123/P
4	Config./Parameters
1	Configurations
9	Local bus unit
...	...

At this point it is possible to choose one of the following items:

1. Presence
2. Release 1
3. Release 2
4. Release 3
5. Release 4
6. Release 6
7. Release 7
8. Release 8

Selecting "Presence" sets the presence/absence of a unit on the local bus.

Selecting Release x the configuration parameters of release x on the local bus unit are read/set, for example selecting:

Key to be pressed	Item selected
...	...
4	Release 3
1	Source

The setting of the activation signal of release no. 3 is displayed; pressing the ENTER key launches editing mode (the cursor starts blinking); the setting of the activation signal is changed using the keys ← and →.

If "Custom" is selected, when ENTER is pressed the current setting is displayed, for example:

```
  ALARM 1 4...6
→ L Pre-alarm
  L Timing
→ S Timing
```

Where the arrows indicate which elements of the ALARM 1 block are selected.

With the keys ↑ and ↓ the previous/next screen is displayed and with the keys ← and → the selected element is activated/deactivated (the arrow next to the element is displayed/removed).

There are 18 blocks, each of which is made up of eight elements and is displayed in three consecutive screens; up to 8 elements may be activated for each block.

On the last screen of each block it is possible to define the AND/OR logic applied to the selected elements and the minimum release activation time.

15.6.2 Parameters

The PR123/P protection unit has two alternative parameter sets, Set A and Set B; the parameter reading/programming menu contemplates the choice of the set of parameters to be displayed/ edited:

1. Set A
2. Set B

After having selected the test on which to operate, the menu for choosing the type of protection is accessed:

1. L prot.
2. S prot.
3. S2 prot.
4. D prot.
5. I prot.
6. G prot.
7. Ext G prot.
8. U prot.
9. T prot.
10. LC1 prot.
11. LC2 prot.
12. Iw prot.
13. Rc prot.
14. MCR prot.
15. UV prot.
16. OV prot.
17. RV prot.
18. RP prot.
19. UF prot.
20. OF prot.

For example, selecting:

Key to be pressed	Item selected
1	Operation mode
x	PR123/P
4	Config./Parameters
2	Parameters
1	Set A
1	Protection L
ENTER	

enters the screen that displays the parameters of protection L and the following screen appears:

```
L prot  t=k/i2[...]
Threshold: x.xx In
Time: x.xx s
Thermal mem: ON[OFF]
```

Pressing the ENTER key launches editing mode (the cursor starts blinking); using the keys ↑ and ↓ the cursor is positioned on the desired parameter and the keys ← and → are used to modify the value of the parameters in the allowed range.

15.7 Information

On this menu it is possible to view some information on the protection unit and the circuit breaker.

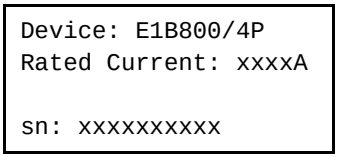
The menu is divided into:

1. Protection unit
2. Circuit breaker

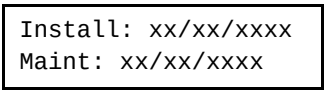
For example, starting from the main menu, selecting:

Key to be pressed	Item selected
1	Operation mode
x	PR123/P
5	Information
	Circuit breaker
ENTER	

enters the screen that displays information on the circuit breaker:



Pressing the keys ↑ and ↓ passes to the display of the next/previous screen:



15.8 Status

On this menu it is possible to view any signals of an error in configuration/wiring of the protection unit and of the circuit breaker. In particular, one or more of the following messages may be displayed:

1. No alarm
2. L Prealarm
3. T Prealarm
4. L1 Sensor error
5. L2 Sensor error
6. L3 Sensor error
7. Ne Sensor error
8. Gext sensor error
9. TC disconnected
10. Rating Plug error
11. Installation error
12. Device error
13. Invalid Date
14. Configuration error
15. CB status error

Refer to the release manual for the solution of the errors signalled.