



The Raptor – Default Test Templates in Raptor HH

April, 2013

General parts of main screen:



Timer

Format

- Seconds
- Cycles
- HH:MM:SS

Mode

- Chronometer
- Countdown

Binary input

Mode

- Dry contact
- 15 V
- 1.5 V

Activation

- When closing (NO)
- When opened (NC)

Stop condition

- Push
- Binary input
- Zero current

RC00:General

00003.000 S cdwn C/NO BI

000.0 mA A1in 000.0 mV V2in

000.0 Deg A1-Io 000.0 Deg V2-A1

S(V2A1): 0.000 VA
C(V2A1): 1.000
Z(V2A1):
Io/A1:

Options Save Filter Menu

1 t 05.00 kA Out

Pulse Hold Enabled

Meters

Hardware Calculated

Pag. 1/2

- A1in
- V1in
- V2in
- Binary input

A1in

DC RMS max

Auto range

% nominal 100.0 mA

Transducer

Meters

Hardware Calculated

Pag. 2/2

- V2in-A1in
- A1in-Iout
- V2in-Iout

Meters

Hardware Calculated

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- (V2in,Iout)
- (V1in,Iout)
- Cosφ (V2in,A1in)
- Cosφ (V2in,Iout)

Meters

Hardware Calculated

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- (Vout,A1in)
- (V2in,A1in)
- (V2in,Iout)
- (V1in,Iout)

Meters

Hardware Calculated

Pag. 6/7

- (V2in,A1in)
- (V2in,Iout)
- (V1in,Iout)
- Ratio(Iout,A1in)

RC00:General

00000.000 S C/NO PUSH

Default config. Meters

General template Stop settings

Options Save Filter Menu

1 t 00.00 kA Out

Pulse Hold Enabled

Output configuration

Pass-through secondary Auxiliary secondary

Adjustment Range

- Current 2. 15000 A
- Voltage

Display

- % nominal
- Display RMS max

Advanced options

- Line sync.
- Polarized

RC00:General

00000.000 S C/NO PUSH

Options Save Hold Menu

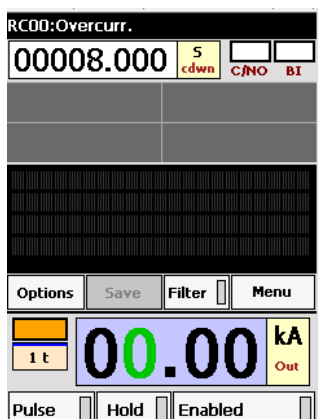
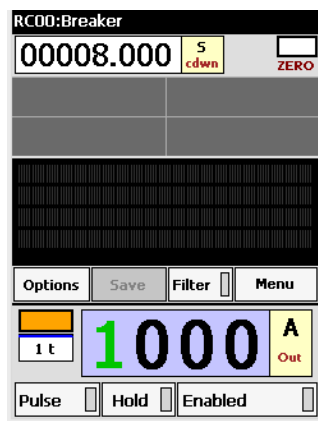
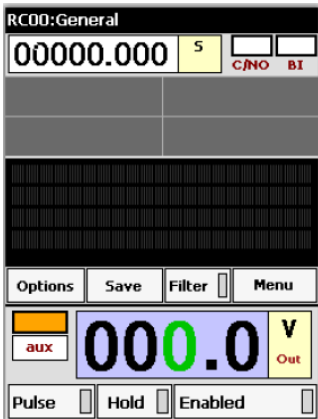
Templates

Templates

- General
- Circuit breaker
- Overcurrent relay
- Current transform.(CT)
- Rogowski CT
- Low power CT
- AC resistance
- Ground grid
- CT burden

New Delete Copy Load

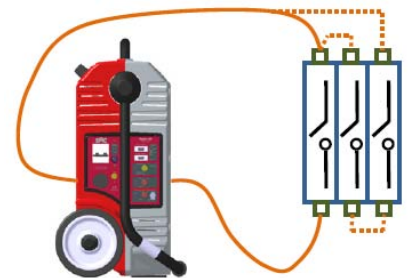
TEST TEMPLATES: Default test templates are factory configured tests, providing the user the capacity to just select the appropriate template and start the test, however all these test templates, configuration and conditions, can be modified by the operator to their own convenience, and can also create their own test templates. In every test template it is always possible to return to the default configuration.



1. **General:** Default screen. General Template, it allows selecting and controlling any output value. This can be also selected directly on the Options Button, besides the Test Templates listing. Possibility to choose the Output Source (High current Pass-Through Secondary or Auxiliary Secondary – current or voltage)

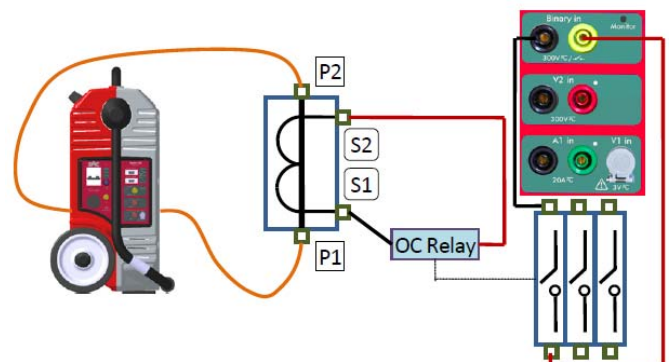
2. **Circuit Breaker:** Measures trip time by detecting zero current stop condition. Classical application for trip time testing of MCB, MCCB, etc, both in terms of its thermal element and its magnetic or instantaneous element.

Injection by Pass-Through Secondary (main Ammeter, Io)
 Timer as countdown
 Timer stops by Zero Current



3. **Overcurrent Relay:** Through injection of a fault current through the primary of the CT, check correct operation of the protection, the effective trip of the breaker, and verify the complete primary/secondary/primary loop.

Injection by Pass-Through Secondary (main Ammeter, Io)
 Timer as countdown
 Timer stops by Binary Input activation
 Binary input as Dry contact, Normally Open





4. Current Transformer (CT): Measures CT Turn ratio, polarity and angle error. With same template, determine connected burden in VA at the test current, in impedance and the power factor of the burden.

Injection into the primary from the Raptor and measuring its secondary with the ammeter and voltmeter. Ratio meter displayed as $I_o/A1$ and/or ratio error, if theoretic ratio of the CT entered.

Injection by Pass-Through Secondary (main Ammeter, I_o)

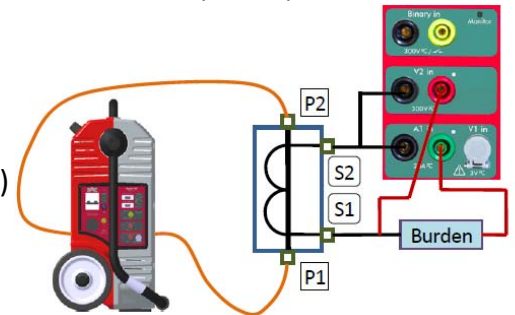
Timer as countdown

Meters:

- Ammeter (A1)
- Voltmeter (V2)
- Phase angle of primary and secondary currents (A1- I_o)
- Phase angle of secondary measurements (V2-A1)

Calculated parameters:

- CT Turn Ratio ($I_o/A1in$)
- Ratio error
- Burden, Z (V2A1)
- Apparent Power in VA, S (V2A1)
- $\cos\phi$ (V2A1)



5/6. Rogowski CT/Low Power CT: Measures CT ratio, polarity and angle error of Rogowski transformers, or also low power CT.

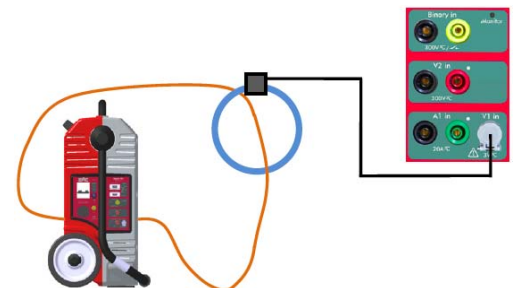
Injection by Pass-Through Secondary (main Ammeter, I_o)

Meters:

- Low signal Voltmeter (V1)
- Phase (polarity) between primary and secondary of the Transformer (V1- I_o)

Calculated parameters:

- CT turn ratio ($I_o/V1$)



7. AC resistance: measures the resistance of connections, contacts and other elements with a very low induction, calculated by injecting high current and measuring voltage drop in the element terminals.

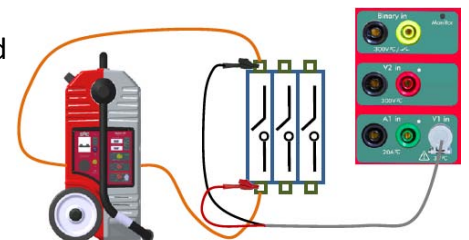
Injection by Pass-Through Secondary (main Ammeter, I_o), countdown timer.

Meters:

- Low signal Voltmeter (V1)
- Phase between current injected and measured voltage (V1- I_o)

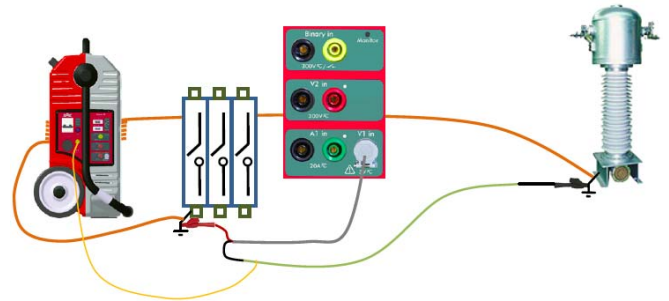
Calculated parameters:

- $\cos\phi$ (V1 I_o)
- Impedance Z (V1 I_o)
- Resistance R (V1 I_o)





- 8. Ground Grid:** By injecting high current and measuring with the low level signal voltmeter, it is possible to detect the existence of any excessive stress (bad or eroded contact) in the ground grid. C-15 configuration at least for grid test. Cable cross-section about 40-50 mm, winding 10 turns in the equipment. Injection by Pass-Through Secondary (main Ammeter, I_o)
 Timer as chronometer. Stop condition by push button.
 Meters: Low signal Voltmeter (V1)



- 9. CT Burden:** Burden connected must be lower than rated CT burden, and so this template enable us to determine if the CT is suitable or not for this burden. By injecting current through secondary, calculates impedance, power and power factor of the load. Current to be injected into the burden is the nominal secondary current of the CT, that is, either 1 A or 5 A.

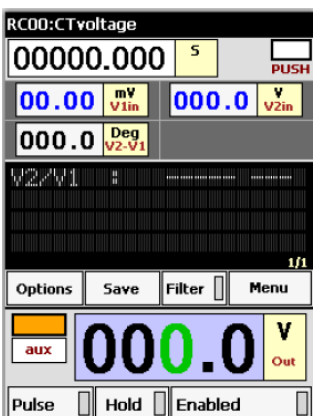
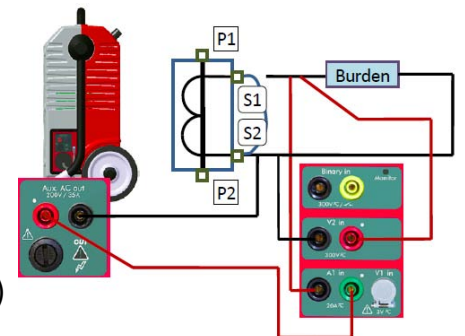
Injection through auxiliary secondary (current)
 Timer as chronometer. Stop condition by push button.

Meters:

- Ammeter (A1)
- Voltmeter (V2)
- Phase angle of secondary measurements (V2-A1)

Calculated parameters:

- Burden, Z (V2A1)
- Apparent Power in VA, S (V2A1)
- Cosφ (V2A1)



- 10. CT, Voltage method:** Calculates the CT turn ratio and polarity, by injecting Voltage, for the cases where is not possible to directly inject primary current into the CT, for whatever reason, being this template an alternative. Disconnecting the load, it is performed applying voltage on its secondary side with the auxiliary output of Raptor, and measuring the secondary voltage with the voltmeter and the primary voltage with the low signal voltmeter.

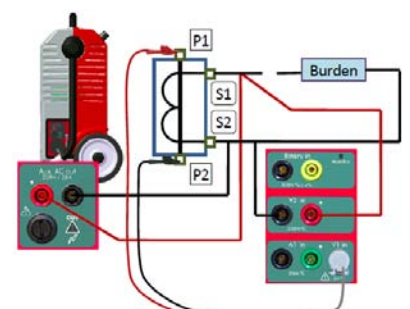
Injection through auxiliary secondary (Voltage)
 Timer as chronometer. Stop condition by push button.

Meters:

- Voltmeter (V2)
- Low Level Voltmeter (V1)
- Phase angle between both voltmeters (V2-V1)

Calculated parameters:

- CT turn ratio (V2/V1)





11. Voltage Transformer (VT): Checks VT turn ratio, polarity and primary/secondary phase angle, by applying voltage to the primary with the Raptor auxiliary voltage output, measuring the primary voltage with the voltmeter and the secondary voltage with the low signal voltmeter.

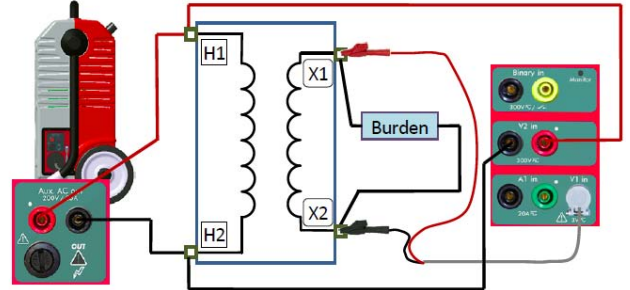
Injection through auxiliary secondary (Voltage)
 Timer as chronometer. Stop condition by push button

Meters:

- Voltmeter (V2)
- Low Level Voltmeter (V1)
- Phase (polarity) of VT (V2-V1)

Calculated parameters:

- VT turn ratio (V2/V1)



12. VT burden: Calculate impedance, power and power factor of the load, disconnecting the secondary of the VT, and applying voltage to the load from the auxiliary voltage output of Raptor, and measuring with the ammeter and voltmeter.

Injection through auxiliary secondary (voltage)

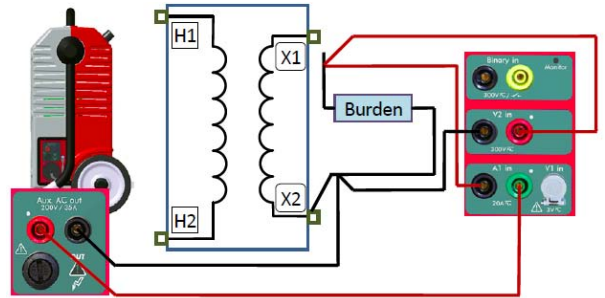
Timer as chronometer
 Stop condition by push button

Meters:

- Ammeter (A1)
- Voltmeter (V2)
- Phase angle of (V2-A1)

Calculated parameters:

- Burden Z (V2A1)
- Apparent Power in VA, S (V2A1)
- Cosφ (V2A1)



13. Short-circuited PT: Template designed to carry out short-circuited impedance tests in PT. Several data are got with this template, injecting current in one winding, shorting the other, and measuring using the ammeter and voltmeter.

Injection through auxiliary secondary (current)

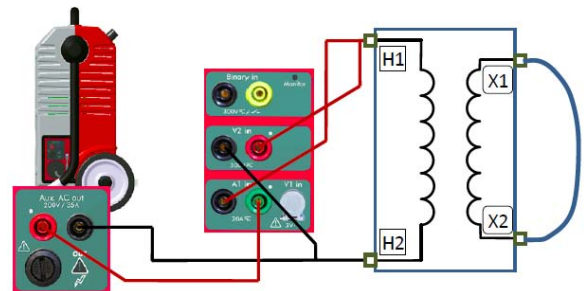
Timer as chronometer
 Stop condition by push button

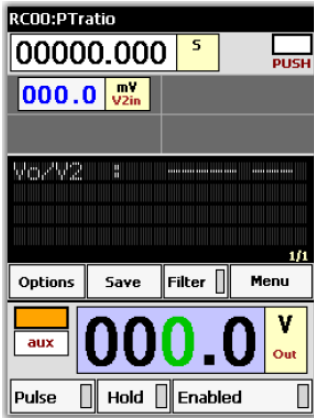
Meters:

- Ammeter (A1)
- Voltmeter (V2)
- Phase angle (V2-A1)

Calculated parameters:

- Cosφ (V2A1)
- PT short-circuit Impedance Z (V2A1)
- PT reactance losses X (V2A1)
- Resistance R (V2A1)





14. PT ratio: Measures the voltage ratio between the primary winding and the relative secondary winding of a PT. If the PT is three-phase, a measurement must carry out in each phase. If the neutral is not accessible in either of the two windings, inject between two phases (H1H2) and measure on the Low side in agreement with the calculation and connection diagram required, depending on the PT connection group.

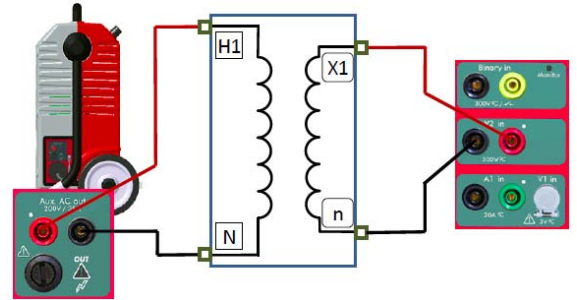
Injection through auxiliary secondary (Voltage)

Timer as chronometer

Stop condition by push button

Calculated parameters:

- Voltage ratio (V_o/V_2)



15. New Template: the user can copy, edit and change the test templates; the user can also easily create new Test Templates, with the configuration desired, and save them with a new name.



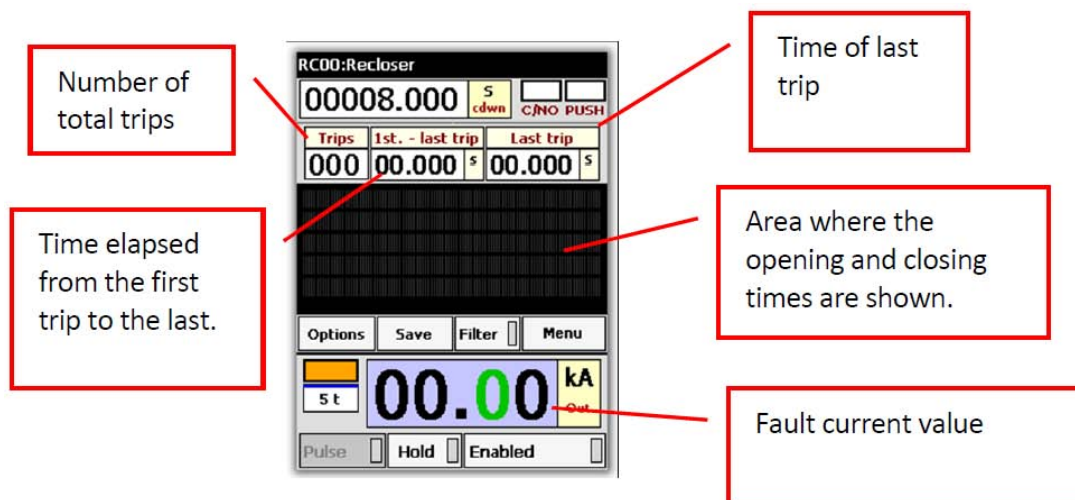
FUNCTIONS: This is a kind of automatic tests, pre-designed from factory:

Recloser:

This function is designed to verify, in a very simple manner, the correct operation of an integrated RECLOSER; that is, a device that include the MV circuit breaker, the protection CTs, the protection relay with recloser function and the total control of the system. These devices are found more and more frequently in Medium Voltage Distribution circuits.

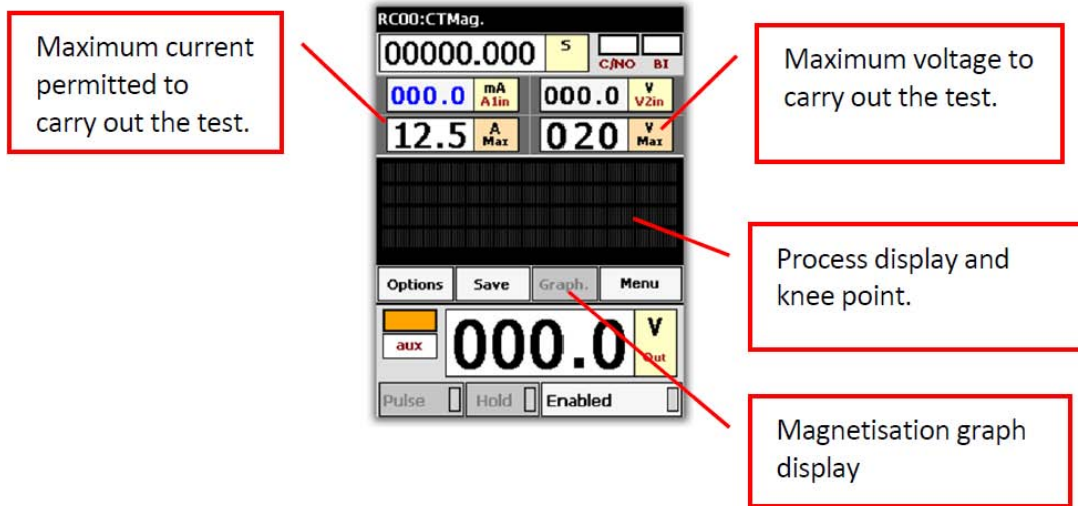
The results shown include trip time and reclosing time of each one of the reclosing cycles that the device actually carries out.

It does not require any type of configuration by the operator.

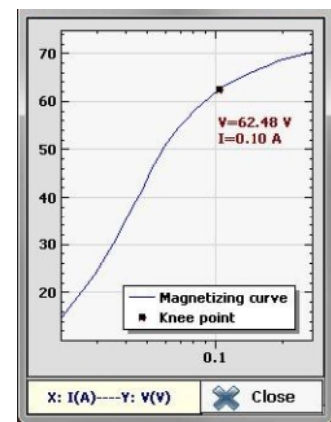


CT Magnetization Curve and Knee Point:

Automatic test, using the IEC standard criteria, for obtaining the CT magnetization curve and knee point. It is performed by applying voltage to the secondary of the CT, (auxiliary output from the RAPTOR), and measuring with the voltmeter and ammeter. The test is fully automatic, including the final core demagnetization, and only requires leaving open the CT primary. NOTE: This test is limited by the output voltage of 200 V. This voltage is sufficient for measuring CTs (20% saturated above nominal) but limited for protection CT's where voltage may eventually need more than 1000 V to saturate.



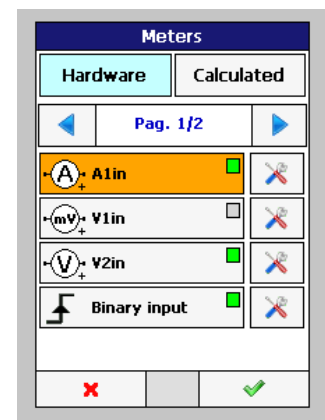
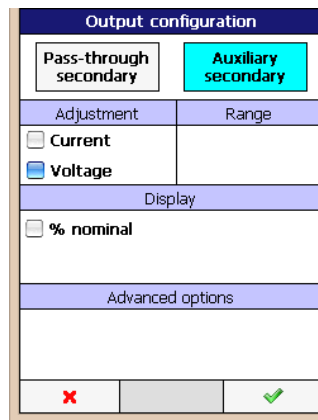
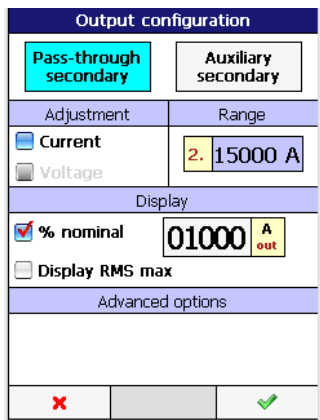
The test consists of injecting a ramp of ascending voltage values up to 20% above the maximum voltage entered or a maximum of 40 pitches (logarithmic voltage increases). After the maximum test value has been reached, the CT is demagnetized, generating the same voltage points, in descending order and with a smaller time interval. When the test ends, by tapping on the Graph button, it is possible to see the graph of the test points that make up the magnetizing curve and the position of the knee point, if it has been detected. All voltage and current values measured, and magnetization curve graph will be displayed in the subsequent report.



The following chart describes what Test Templates and Functions in Raptor use the Pass-Through Secondary or the Auxiliary Secondary, in current or in voltage mode, and the related measurement section used (apart from the measurement of main output selected, always available on every screen).

In the General Test screen it is possible to select either the high current or the auxiliary secondary. Any of the test templates can be modified, being possible to add meters and the calculated parameters desired by the user.

	Test Templates	Volt.	Amm.	L. L. Volt.	Phase meters	Binary input	Zero Curr.
High Current (pass-through)	General Test	•	•	•	•	•	•
	Circuit Breaker						•
	Overcurrent Relay					•	
	Current Transformer CT	•	•		•		
	Rogowski CT/Low Power CT			•	•		
	AC resistance			•	•		
	Ground Grid			•			
Auxiliary Secondary- Current	General Test	•	•	•	•	•	•
	CT burden	•	•		•		
	Short-circuited PT	•	•		•		
Auxiliary Secondary- Voltage	General Test	•	•	•	•	•	•
	CT, voltage method	•		•	•		
	Voltage Transformer	•		•	•		
	VT burden	•	•		•		
	PT Ratio	•					
	CT magnetization curve/knee point	•	•				



NOTE: This paper is not intended as a user manual, but a summary of main functions included by default in the Raptor system for purchase evaluation. At the time of using the equipment, always consult the appropriate user manual, especially regarding safety precautions and dangers actions which must be carefully observed.

*** END OF THE DOCUMENT ***