

**Technical specification for Secondary Injection Relay Test Set**

<u>DESCRIPTION</u>	
1	<p>The single phase relay test set should be suited for the testing and adjustments of all the types of production and distribution relays. In addition to the above, it should also test converters and energy meters. The following shall be the list of the most important relays that should be tested: Synchronizing (25), Over/Under voltage (27, 59), Power (32, 92), Over/Under current (50, 50N, 51, 37), Reverse phase current (46), Power factor (55), Directional (67, 67N), Reclosure (79), Frequency and frequency rate of change (81), Motor protection (86), Differential (87), Directional voltage (91).</p> <p>The basic test set function shall be to generate current and voltages, and to stop generation as the relay trips. Test results are kept in memory, and to be transferred to a PC at a later time, along with settings. The test set shall be to be controlled by a selection knob with a large graphic LCD display, that allows the easy access to the menu-driven functions, and displays all selected measurements.</p>
2	<p><u>APPLICABLE STANDARDS</u></p> <p>The test set to be CE marked.</p> <p>A) Electromagnetic Compatibility: EN61326 + A1 + A2. B) Low Voltage Directive: EN 61010-1.</p>
3	<p><u>Characteristics of the unit3</u></p>
3.1	<p><u>Main generator</u></p> <ul style="list-style-type: none">- The main generator shall have three outputs: currents, voltage AC, voltage DC with provision of generating at maximum power or at reduced power.- On all outputs the capability of - Current Ranges: 10, 40, 100 A. Output power: 800 VA.- AC voltage range: 250 V. Output power: 500 VA.- DC voltage range: 300 V. Output power: 300 W.- Zero crossing control. All AC outputs shall be generated and stopped as the output shall be zero.
3.2	<p><u>Auxiliary AC voltage</u></p> <ul style="list-style-type: none">- Output ranges: 65 – 130 - 260 V. Output power: 30 VA.- Frequency range: from 15 Hz to 400 Hz. At frequencies less than 40 Hz the output power is reduced.- Phase shifting, from 0° to 360°; resolution: 1°.- Pre-fault voltage independent from the fault voltage in amplitude, frequency and phase
3.3	<p><u>FREQUENCY GENERATOR</u></p> <ul style="list-style-type: none">- Frequency range: 40.000 Hz to 500.000 Hz; error: 100 ppm.- Frequency rate of change range: from 0.01 to 99.99 Hz/s.
3.4	<p><u>Auxiliary DC voltage</u></p> <ul style="list-style-type: none">- Ranges: 130 V and 240 V.- Power: 90 W at full range; max. currents: 0.9 A @ 130 V and 0.45 A @ 240 V.



3.5	<p><u>Timer</u></p> <ul style="list-style-type: none">- The timer shall have two inputs, START and STOP.- Inputs level: Normal Open or Normal Close.- Inputs type: clean or under voltage, maximum 275 V DC.- Timer ranges: 9.999 s; 99.99 s; 99999.9 s. Accuracy: $\pm 0.005\%$ of value $\pm 0.01\%$ of range.- Counting mode: for the test of energy meters. Maximum input frequency: 10 kHz.
3.6	<p><u>Auxiliary contacts</u></p> <ul style="list-style-type: none">- Two auxiliary make and break contacts shall have a delay from 0 to 99.99 s with respect to test start.- Contacts characteristics: 5 A; 250 V AC; 120 V DC
3.7	<p><u>Outputs measurement</u></p> <ul style="list-style-type: none">- The display : AC current (AC or DC voltage); auxiliary AC voltage; auxiliary DC voltage.- Type of measurement: true rms for AC outputs; average for DC outputs.- Resolution: 4 digits.- Accuracy, DC: 0.5% of reading $\pm 0,1\%$ of range; AC: 1% of reading $\pm 0,2\%$ of range.- With respect to the auxiliary voltage, measurement of angles of: current, AC voltage, mains. Range: 0 – 360°; resolution 1°; accuracy $\pm 1^\circ \pm 1$ DIGIT.- Active, reactive, total power, power factor; impedance, active and reactive component, argument.
3.8	<p><u>External inputs measurement</u></p> <ul style="list-style-type: none">- Input current ranges. 20 mA or 10 A, AC or DC. Accuracy, DC: 0.5% of reading $\pm 0,1\%$ of range; AC: 1% of reading $\pm 0,2\%$ of range.- Maximum input voltage: 600 V, AC or DC. Accuracy, DC: 0.5% of reading $\pm 0,1\%$ of range; AC: 1% of reading $\pm 0,2\%$ of range.- Current or voltage waveform display: amplitude and time adjustment.- Angle between I_{ext} or V_{ext} and V_{aux}. Accuracy: $1^\circ \pm 1$ digit.- AC voltage frequency. Accuracy: 400 ppm.- Active, reactive, total power, power factor; impedance, active and reactive component, argument.
3.9	<p><u>Test control</u></p> <ul style="list-style-type: none">- Selections , for the test of over- or under-(current, voltage..) relays.. OFF: main outputs not generated;. ON: all outputs generated;. From OFF to ON + time: all outputs shall be generated and timer shall start; at STOP, outputs are removed and time shall be displayed.. From ON to OFF + time: outputs shall be removed and timer shall start; at STOP, the time shall be displayed.- Reclose test. It shall be possible to select the test of a reclosing scheme.
3.10	<p><u>Menu selections</u></p> <ul style="list-style-type: none">- Any setting shall be saved to and recalled from the memory. Up to 10 settings shall be stored.- Test results shall be stored in the memory (up to 500 results may be stored).- At the end of test, settings and test results shall be transmitted to a PC provided with a suitable software, that allows saving test results, examining them and so on.



3.11	<u>Other characteristics</u> <ul style="list-style-type: none">- Display: graphical; pixels: 240x64; view area: 135x40.- Set of LED's confirming inputs and outputs status.- Set of resistors, 50 W each. Available values: 0.5; 1; 22; 470; 1000; 2200 Ohm.- Interface: USB.- Mains supply: 230 V \pm 15%; 50-60 Hz.- Dimensions: Bidders to specify.- Weight: Bidders to specify
4	<u>Software</u> <ul style="list-style-type: none">- Download tests from the instrument.- Upload tests created on the software.- Create graphs from relay test results.- Display all test set parameters when in use
	<u>Power supply</u> <ul style="list-style-type: none">- Mains supply: 220 V \pm 15%; 50-60 Hz.
5	CABLE
5.1	<u>Standard cable set</u> <p>Shall have option to include 17 cables l, with different colours, 2 m long, with different cross section and terminations.</p>
5.2	<u>Transit case</u> <p>The transit case shall protect the equipment from shocks due to a fall from 1m</p>