FREJA Win

Software for FREJA relay testing system

A Megger Group Company

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In FREJA™ Win, the all-round General instrument program serves as a convenient, easy to understand, user-friendly toolbox. On the Connect page, you can enter information about how to connect the relay, including pictures if so desired.

On the Sequence page, you can vary all generator parameters independently. You can have up to 25 different states (prefault, fault1, prefault, fault2, prefault, fault3 etc.). This is useful when testing autoreclose relays or motor protection. It's also possible to generate up to the 25th harmonic.

On the Ramp page, you can ramp all generator parameters independently. Amplitudes and angles are shown on a vector diagram, and values can be set using the knob on FREJA or the PC keyboard and mouse, on-line as well.

Distance instrument

Configuration page

The Distance instrument program is designed to test distance relays. On the Configuration page, you enter the number of zones that are to be tested and also the time and impedance tolerances, thereby creating an automatic test. No programming is needed. Later, when you recall this object via the Control center, all settings are re-established so that you can start testing immediately.

Connect page

On the Connect page you enter information about how to make connections to the relay, including pictures if so desired. Since this information is saved together with the object in the Control center, it can be displayed again the next time you want to test this relay.

Zt page

The Zt page is designed for time testing of a distance relay. Normally, you test one type of fault at a time when testing relays. With FREJA Win, however, you can test all seven fault types automatically if so desired. All you have to do is press the <Start> button. FREJA will test all seven fault types automatically and then compare the readings with the theoretical values that you entered on the Configuration page. If the readings are OK, a green lamp lights. If not, a red lamp lights. If you want to check the reverse direction, the test can start below zero ohms in the 3rd quadrant.

RX-ramp page

The RX-ramp page, which is part of the Distance instrument program, is designed to test the reach of a distance relay. First, you define the start and stop angles and the delta phi between the ramps. Then press the <Start> button and relax. FREJA will automatically test all seven types of faults using the timesaving "search-half" method. You can also define your own ramps, using the mouse to specify starting and ending points wherever desired. If you have defined a theoretical reference graph, the program will compare the actual test result with your graph and check for any deviations from the tolerances entered on the Configuration page. If the results are OK, a green lamp lights. If not, a red lamp lights.

RX page

The RX page enables you to define test points manually. You can define different points on the oscilloscope using the mouse or keyboard. Select the automatic mode and press the <Start> button. FREJA will test all points for the selected fault types. The points will be assigned different colors, depending on the trip time. If you select the manual mode, you can use the dial to search for a boundary.

The RX point page, a new feature in FREJA Win 5.2, speeds up the reach tests.

Reference graphs

Efficient testing and performance analysis require well-defined reference values. FREJA can automatically create the IEC and IEEE® standard curves for overcurrent relays. It is also possible to create reference graphs in the impedance plane using the included library of distance relays made by major manufacturers and/or create other characteristics using the standard circular lens and linear elements (including mho, quadrilateral and ice-cream cone shapes).

The cut and paste buttons make it easy to take copies of the first zone and then edit these copies by inserting zone 2 and zone 3 values.

State-of-the-art distance relays having sophisticated impedance characteristics and several setting groups require many parameter settings. The optional ProGraph feature enables you to import the parameter settings from a master selectivity plan prepared in Microsoft® Excel. This eliminates manual transfer errors, and the FREJA software creates the reference graph automatically.

Some relay manufacturers can create a RIO-file with the settings of the relay. Using the FREJA RIO-converter you can create reference graphs based on these settings.

A new feature is the ready-made current curves available for many relay types.
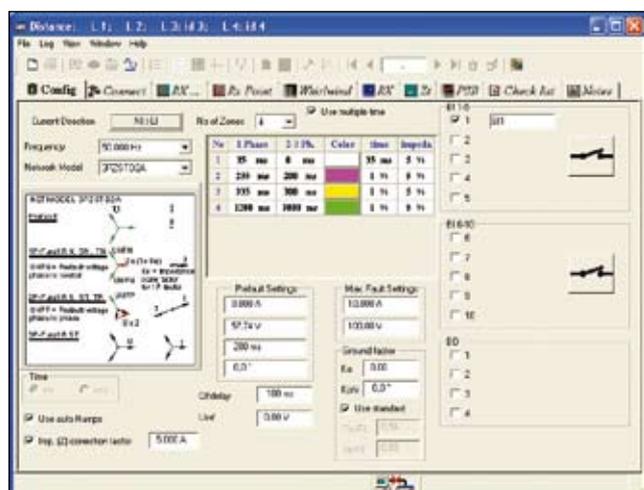
Distance, Config
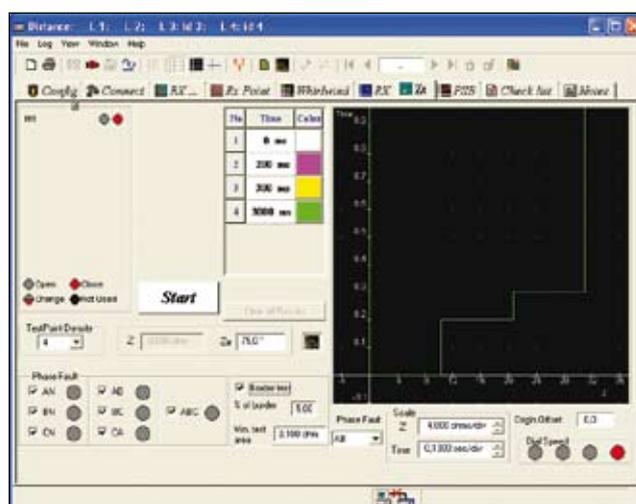
Distance, Zt

Current instrument

The Current testing instrument is designed to test all types of current relays, from electro-mechanic with or without an induction disc to modern numerical relays.

The Config page is where the relay settings will be entered.

In the Pick-up page the system will not just get the pick-up value (start current) but also the drop out and it will also calculate automatically the hysteresis.

The time test, check the trip time at different current values, will be done in the Time test page. A reference curve can be created in the same way as in Distance, by choosing the corresponding time curve and entering the settings. The time test can be run also in a logarithmic scale, time, current or both.

Voltage instrument

The Voltage testing instrument is designed to test all types of voltage relays, from electro-mechanic to modern numerical relays.

The Config page is where the relay settings will be entered.

In the Pick-up page the system will not just get the pick-up value (start voltage) but also the drop out and the hysteresis will be calculate automatically.
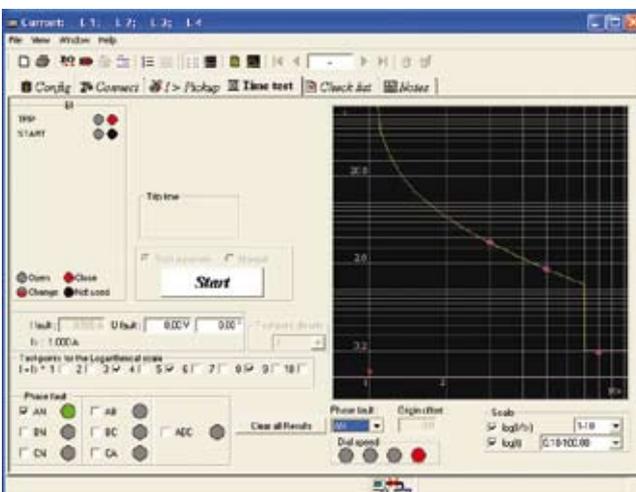
The time test, check the trip time at different voltage values, will be done in the Time Test page. A reference curve can be created in the same way as in Distance, by choosing the corresponding time curve and entering the settings. The time test can be run also in a logarithmic scale, time, current or both.
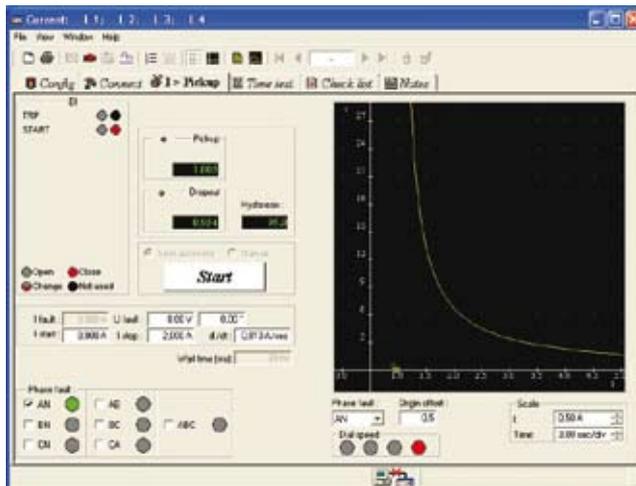
Current instrument, Pick-up
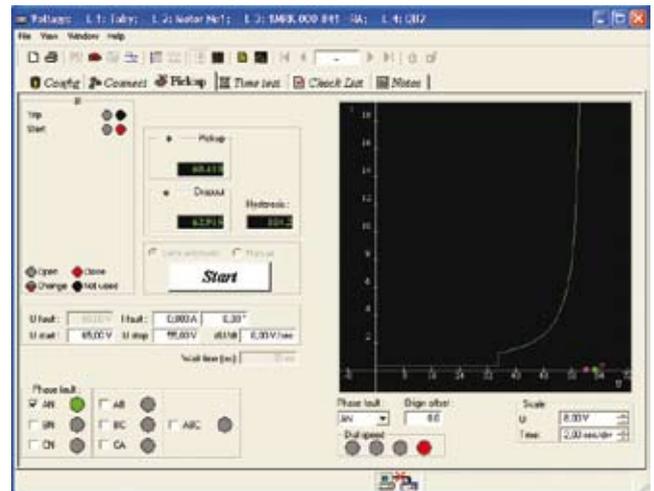
Voltage instrument, Pick-up

Current instrument, Time test
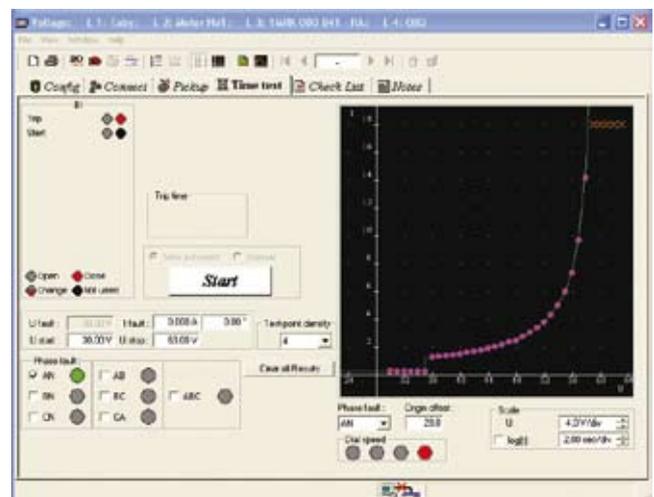
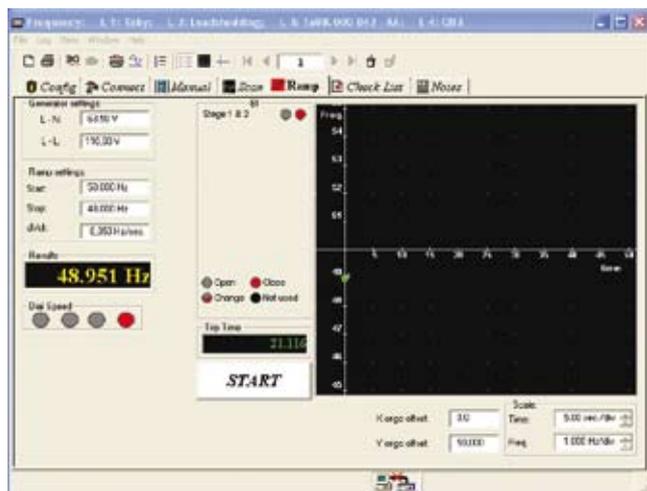
Voltage instrument, Time test

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Frequency instrument

In the Frequency instrument a pre-fault an fault frequency can be generated manually in Manual page as well as an automatic sequence of pre-fault, fault, from a set start value to set stop value to Scan the trip time at different frequency values, useful for relays with two stages.

The Ramp mode will find the set fault frequency.

Autoreclose instrument

The Autoreclose instrument is a combination between Sequence in General and RX in Distance. This is just because it is easier to simulate pre-fault, energizing and dead times as vectors and in the same way it is easier to simulate a fault in a impedance plane.

This instrument will test any autorecloser function on today's modern relays.
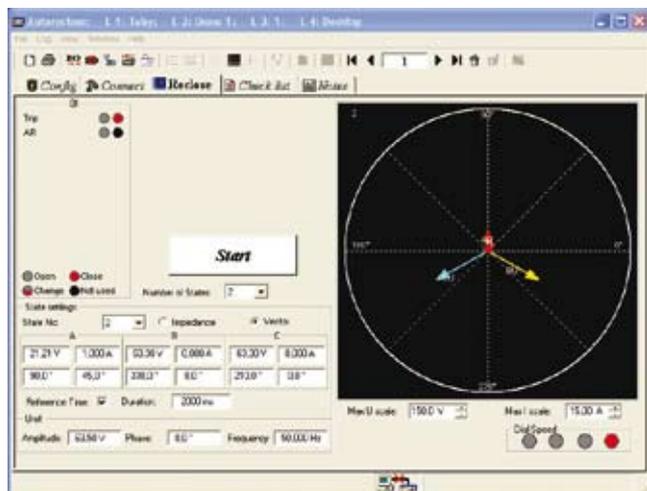
Auto 300

If we take as an example a modern distance relays has several functions activated, besides the distance elements.

By using Auto 300 we can link together different tests made in different instruments, to create an automatic test sequence, so at the end we will have on test containing elements from Distance, Current, Sync and Voltage, for example.
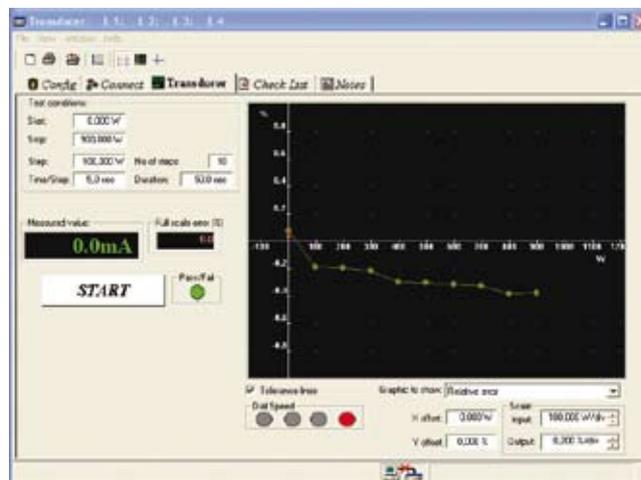
Transducers instrument

The Transducers instrument will test any transducers by checking the output of the transducers and compare it to the settings made in Config.

The result will be showed in linear format, full scale, relative and absolute error.

Frequency instrument, Ramp


Auto 300

Autoreclose instrument
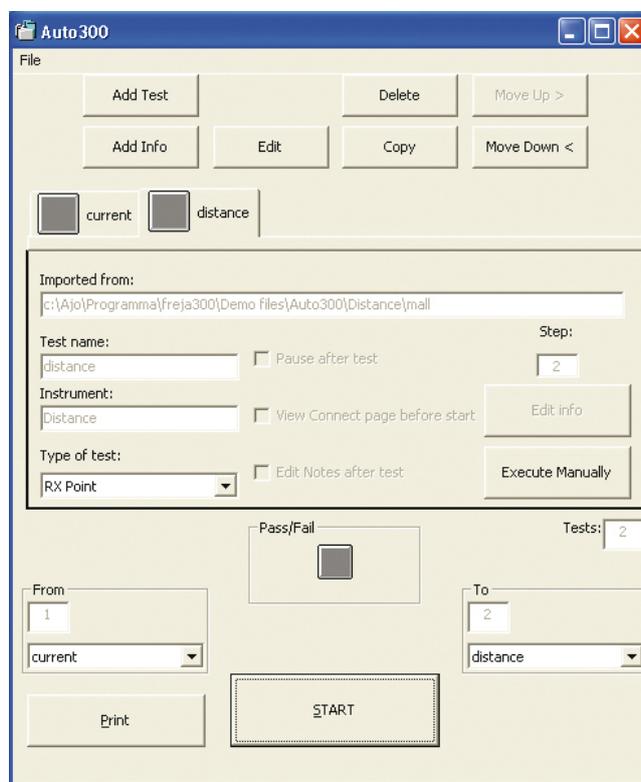
Transducers instrument

Transient instrument

With the help of Transient, Freja will generate (playback) a waveform recorded by a disturbance recorder. The file formats supported by Transient are Comtrade, ASCII, EMTP WAX, EMTP PC and Inductic 65.

Auto 21

Auto 21 is a converter that will convert old test plans made with Freja 21/21D and using Freja DOS software, to a Windows compatible format that ken be used together with FrejaWin and Freja.
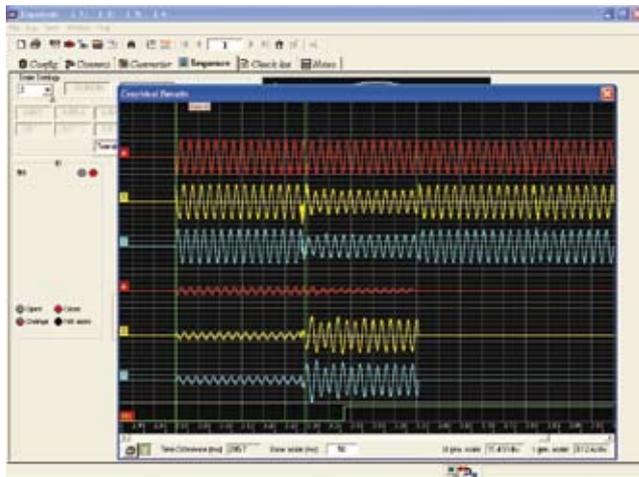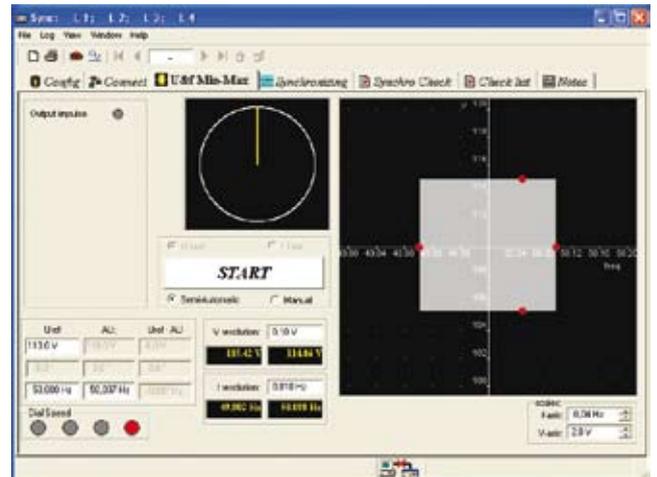
Sync instrument

U-f Min & Max

The U-f Min & Max part of the Sync instrument program is designed especially to test voltage and frequency boundaries for a synchronizing relay. This test is carried out automatically. Simply press the <Start> button, whereupon the program itself searches for the boundaries.

Synchronizing page

The Synchronizing page is designed to measure lead-time. It also enables you to measure the pulses sent out from the synchronizing relay.
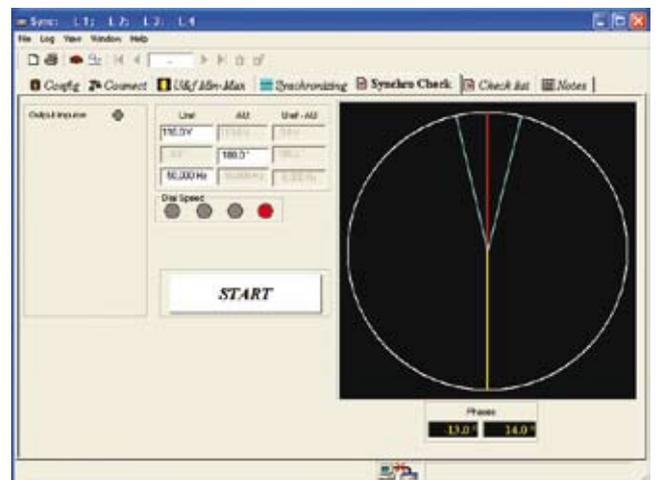
Synchro Check page

The Synchro Check page is designed to test synchrocheck relays.

First set the phase angle to +20° (or some other starting point). Then change the phase angle until you reach the boundary. You press the <Save> button to store the result. Now test on the other side, starting at -20°, change the phase angle until you reach the other boundary.

Transient instrument

Sync, U-f Min & Max
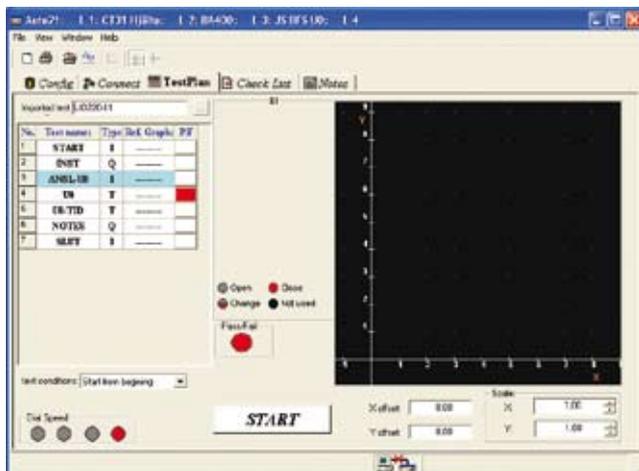
Auto 21 instrument

Sync, Synchro Check

Differential instrument

The Differential instrument is designed to test transformer protection relays and works with FREJA 306 or with FREJA 300 together with external amplifiers CA30 or CA3, as it makes use of 6 current generators.

It can be used to test multi winding transformer protection relays, by testing a pair of windings at a time.

FREJA Differential can also be used to test differential generator protection relays and line differential protection relays.

The data for the protected power transformer are entered in a very intuitive way that cannot be misunderstood by the user. This is done by using buttons and icons that immediately show to the user the effect of his choices. The injected currents are shown both in primary and secondary values, depending on the entered current transformers information and star point earthing.

The Stabilizing page has the purpose of verifying that the connections and settings in FREJA are correct by generating external faults and verifying that the relay is stable. The operator is also requested to read the measured values by the relay and enter them in the test page. The values will then be reported in the final report.

The Time Test page allows to verify the operate time of the differential relay. Several fault injections can be programmed and the page reports the statistics of the measured operate times (minimum, maximum and average values).

The Pick-up page allows the test of the minimum operating current of the differential relay for each winding, which is a test on the sensitivity of the relay. This test also makes use of pseudo-continuous ramp injections.

In the page Bias Characteristic it is possible to test the operating relay characteristic by running pseudo-continuous ramps (for testing the static accuracy of the relay) or ramps done by sequences of pre-fault and fault steady state simulations, called as "binary search", more suitable for commissioning tests. The characteristic can be tested with or without making use of the reference graph.

The Harmonics page verifies the relay capability of not issuing the trip signal for faults in the trip area of the restrained characteristic, when a certain level of harmonics is present in the fault currents, for each winding of the power transformer. The purpose of this feature is to keep the relay stable during transformer energising or during transformer overexcitation

A very important test, introduced by Programma for the first time, is called Wizard. It will help discovering wrong settings for the differential transformer relays that might cause unwanted trip for external ground faults.

The Wizard will ask important and clear application questions to the relay engineer and will perform some simple tests on the relay in a semi-automatic manner. Depending on the application information entered by the user, the Wizard will report if the relay seems to be correctly set or not with a clear information to the user.
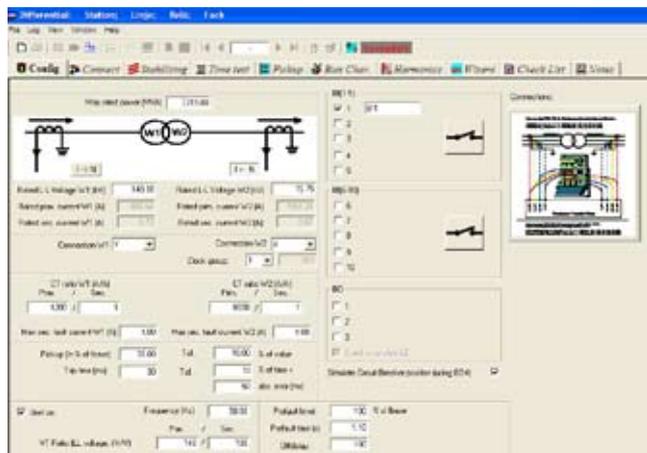
Differential instrument, Config 1
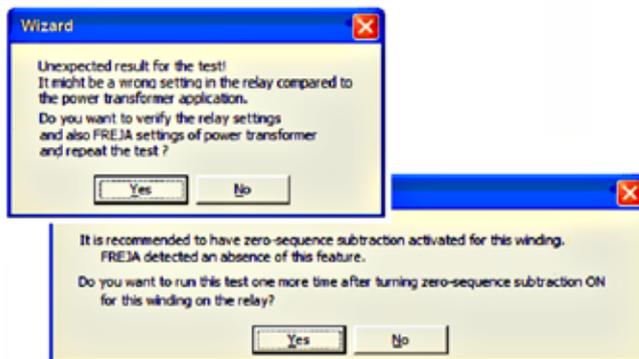
Differential instrument, Wizard
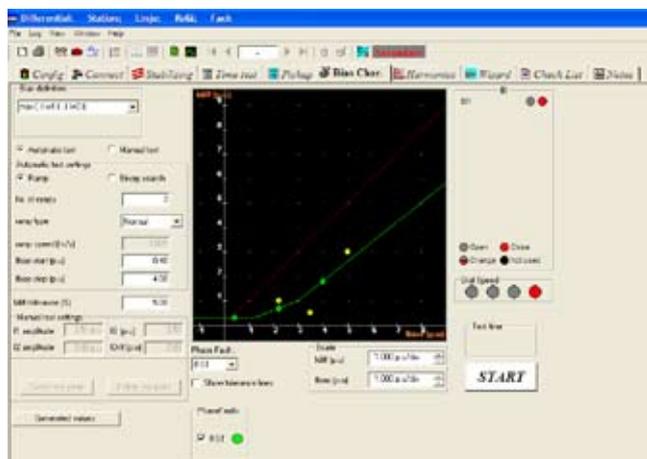
Differential instrument, Bias Char.

Ordering information   **Art.No.**

FREJA Win	
FREJA Win incl. all instruments	**CF-8203X**
FREJA Win upgrade	**CF-8282X**

Programma®