

GGT500

Ground Grid Tester

- Ground Grid Tester with 300 A of testing current
- Micro Ohmmeter with test current up to 500 A DC
- 5 separate test modes: GROUND GRID / SINGLE / CONTIN / BSG / DTR
- Lightweight – 9 kg / 20 lbs
- Measuring range 0 – 999,9 mΩ
- Best resolution 0,1 μΩ
- Typical accuracy ± (0,1 % rdg + 0,1 % FS)
- Remote Control capability
- Test Both Sides Grounded (BSG) Circuit Breakers



Description

Ground Grid Tester GGT500 is the newest test set, specially designed for inspection of substation ground grid. During a measurement the instrument generates 300 A in time period of 60 s or longer. During the test current and voltage drop are measured and displayed simultaneously.

The test is performed with single set of current cables. One cable is connected to the referent grounding point in substation, and the second cable is connected to the testing ground point in the substation. With additional current clamps, current flow through the grounding is being inspected. Based on the current values measured with current clamps the state of the ground grid under the substation can be determined.

GGT500 can also be used as a standard micro ohmmeter for resistance measurement. As a micro ohmmeter to test low resistance values it can provide high test currents of up to 500 A.

GGT500 generates true DC ripple-free current with automatically regulated test ramps. During a test, the GGT500 ramps with increasing current before measuring and decreasing current after

the measurement. This significantly eliminates magnetic transients.

The GGT500 instrument can store internally up to 500 measurements. All measurements are time- and date-stamped. Using the DV-Win software a test can be initiated and controlled from a PC and the results can be stored and displayed on it.

Communication between the GGT500 and PC is through an USB (as standard) or RS232 cable (as an option). DV-Win enables arranging the results as an Excel spread-sheet which can be later shown as a diagram and printed for a report.

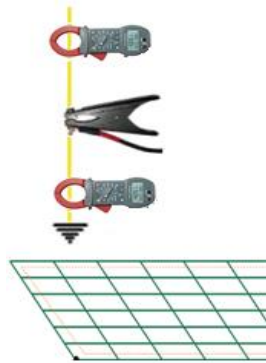
The GGT500 instrument supports five separate test modes:

- Ground Grid mode
- SINGLE mode
- CONTIN mode
- BSG mode (*Both Sides Grounded*)
- DTR test mode (*Dead Tank Resistance*)

Ground Grid Test

This test is performed using predefined test parameters – test current and test duration. By default, the test current is set to 300 A with duration of 60 s. In this time period current clamps are used to inspect current flow through the grounding.

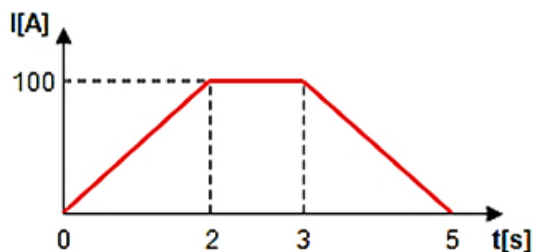
Two currents are measured - current above and current below connected clamp.



Single Test

The GGT500 instrument generates a filtered (true ripple-free) DC current and outputs it in an automatically regulated current ramp. By sloping the current up and down, magnetic transients are virtually eliminated.

Below is an example of a single test ramp for 100 A current.



Continuous Test

RMO-G can generate DC current continuously in predefined test durations, as presented in the table below.

| Test current (A) | Maximum test duration time |
|--------------------|----------------------------|
| 5, 10, 20, 50, 100 | 5 min |
| 200 | 150 s |
| 300 | 90 s |
| 400 | 50 s |
| 500 | 30 s |

To prevent overheating, certain duty cycles apply depending on the test current being used.

BSG test

Grounding circuit breakers from both sides provides increased safety for testing personnel comparing with only one side grounding method.

This test mode is designed for **Both Sides Grounded** testing. A special current clamp meter supplied from the instrument is used for measuring the current through the groundings. The test setup is very simple (same as for the SINGLE test) and all calculations are made automatically by the device internal algorithm.

DTR test

Presence of current transformers (CT) on the dead-tank circuit breakers may introduce errors during contact resistance measurement due to CT magnetizing process. For this reason, it is necessary to saturate the CT prior to measurement.

DTR test menu is designed for resistance measurement of dead-tank circuit breakers. All calculations to detect saturated condition of a CT are done by internal algorithm. Accordingly, the process of setting measurement parameters and testing in this mode is very simple and does not differ much from live-tank circuit breaker testing (in SINGLE / CONTIN test modes).

Application

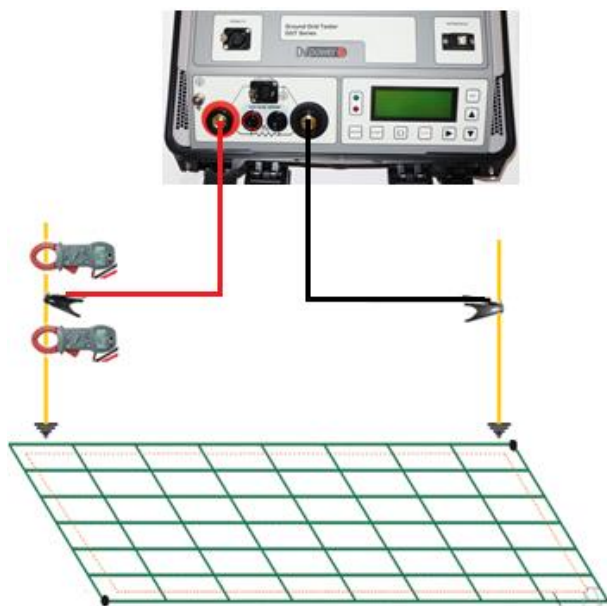
Typical application is measuring resistance of non-inductive test objects:

- Condition of Substation Ground Grid
- High, middle and low voltage circuit breakers (live and dead tank)
- High, middle and low voltage disconnecting switches
- Gas Isolated Switchgears (GIS)
- High-current bus bar joints
- Cable splices
- Welding joints
- Fuses

Connecting the GGT500 to Ground Grid

When performing a test with GGT500, one set of the current cables should be used. One cable is connected to the referent grounding point in a substation. Ideal reference grounding point is usually near the center of substation, next to the major apparatuses like transformers or circuit breakers that has multiple ground connections.

The second current cable is connected to the testing ground point of the substation.

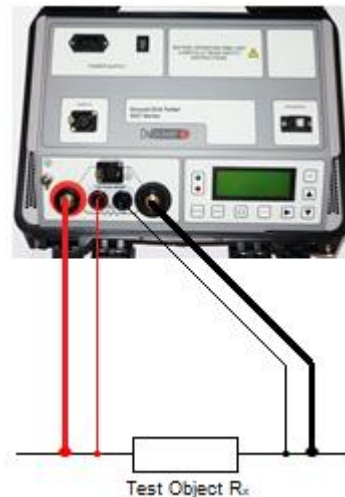


GGT500 cable connection for ground grid test

Two current clamps should be used in order to inspect a current flow through grounding at the testing point. Current is measured above and below connection point.

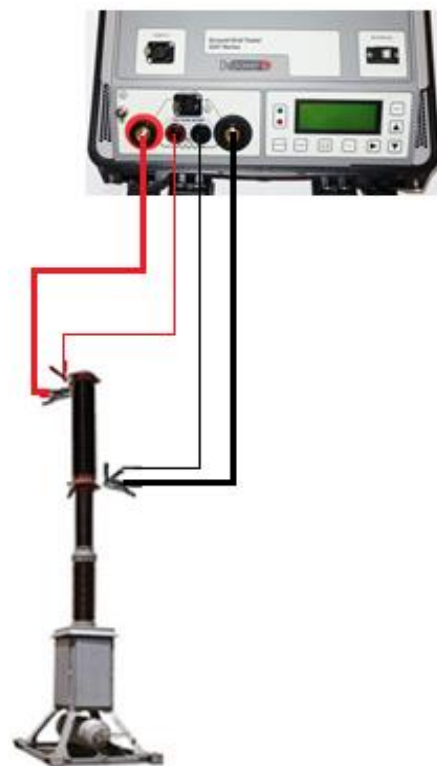
Resistance measurement - Connecting the Test Object to GGT500

The connection diagram corresponds to the Kelvin's (four point) measurement principle. The measuring cables from the "Voltage Sense" sockets are attached as close as possible to Rx, and in between the current feeding cables. That way, resistance of both cables and clamps is almost completely excluded from the resistance measurement.

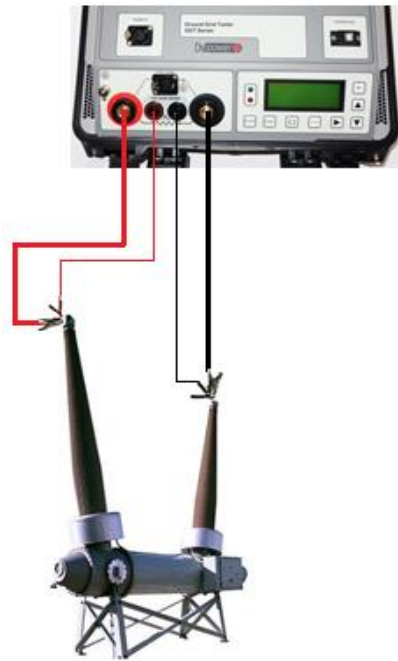


Connecting GGT500 to test object

The connecting diagrams for the live tank and dead tank circuit breakers are presented in the following two figures:



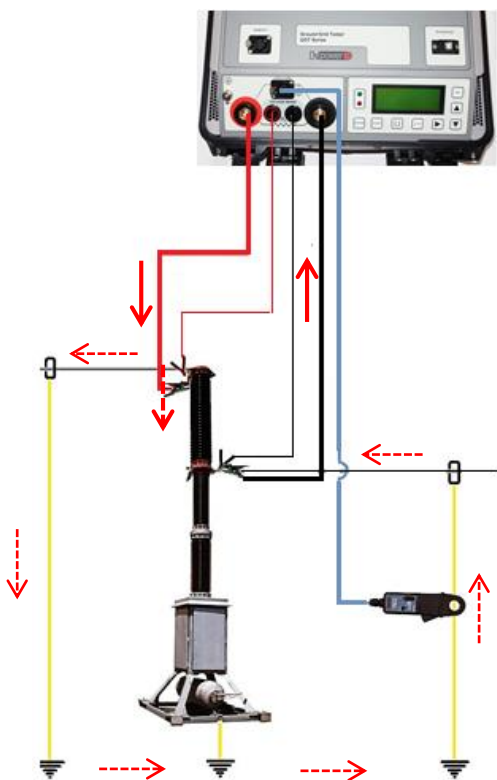
GGT500 cable connection on live-tank circuit breaker



GGT500 cable connection on dead-tank circuit breaker

Connecting GGT500 to Both Sides Grounded Circuit Breaker

Using GGT500 with both sides grounded option it is possible to make a safer measurement of breakers with both terminals of the breaker grounded.



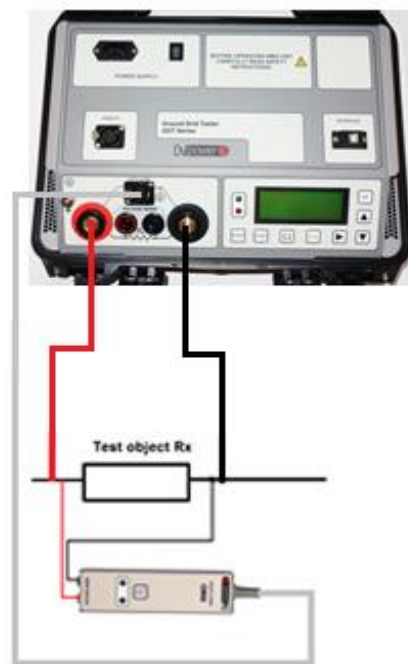
GGT500 cable connection on Both Side Grounded Circuit Breaker

- Total current generated from the RMO
- - - → Current through circuit breaker
- - - - - → Current through groundings

Using the GGT500 with a current clamp-meter is an additional safety feature. Measurement of a circuit breaker contact resistance is done with both sides of the breaker grounded. The GGT500 device will measure the current through the ground circuit connection and add this value to the selected test current value in order to provide the selected test current through the test object.

Remote Control Unit

The GGT500 Remote Control Unit is an optional control unit that is used to start and stop the tests from a remote location, away from the actual GGT500.



Connecting remote control to GGT500

DV-Win software

DV-Win software performs acquisition and analysis of the test results, as well as control of all the GGT500 functions from a PC. The DV-Win also provides several advanced features as a supplement to multiple functions of GGT500 device. Testing in Ground Grid and Continuous modes is upgraded with a sample time feature

allowing a user to record test results in specific time intervals set in seconds.

After completed measurements, the results can be saved in a various formats and test report can be generated and saved or printed. Results can also be downloaded from the device to the PC using several different search filters.

DV-Win Main Features

- Full control of the device in test
- Test reports available in several formats
- Several filters for results download to PC
- Test plans
- Sampling time feature for Ground Grid and CONTIN modes

The screenshot displays the DV-Win software interface. The main window is titled 'GGT DV-Win' and contains several sections:

- Test settings:** Includes 'Operation mode' (Single, Ground Grid, Continuous, BSG, DTRtest), 'Test parameters' (Test current: 50 A, Test duration: 10 s, Sample time: 1 s), and 'Measuring object' (Breaks per phase: 1, Breaking unit: A - Current Path).
- Measurement selection:** A calendar interface for selecting a date range (July 2018) and a current range (mA To: 0 mA).
- Transfer controls:** Includes 'START' and 'STOP' buttons.
- STATUS:** Displays 'Ready for test'.
- Data Table:** A table showing test results for memory slots 17 through 23.

| Memory | Date | Time | Mode | Test Current [mA] | Total Current [mA] | Resistance [mΩ] | Voltage [mV] | Breaking unit |
|--------|------------|-------|------------|-------------------|--------------------|-----------------|--------------|---------------|
| 17 | 2018-02-13 | 17:10 | CONTINUOUS | 49900 | 50000 | 6E-05 | 0.003 | - |
| 18 | 2018-02-13 | 17:11 | CONTINUOUS | 69900 | 70000 | 5E-05 | 0.0034 | - |
| 19 | 2018-02-13 | 17:11 | CONTINUOUS | 100000 | 100000 | 4E-05 | 0.0036 | - |
| 20 | 2018-02-13 | 17:11 | CONTINUOUS | 143000 | 143000 | 2E-05 | 0.0026 | - |
| 21 | 2018-02-13 | 17:11 | CONTINUOUS | 213900 | 214000 | 2E-05 | 0.0036 | - |
| 22 | 2018-02-13 | 17:12 | CONTINUOUS | 150000 | 150000 | 2E-05 | 0.0031 | - |
| 23 | 2018-02-13 | 17:12 | CONTINUOUS | 200000 | 200000 | 2E-05 | 0.0031 | - |

Technical data

Mains power supply

- Connection according to IEC/EN60320-1; C320
- Mains supply: 90 V – 264 V AC
- Frequency: 50 / 60 Hz
- Power consumption: 3970 VA @ 230 V AC
3920 VA @ 115 V AC
- Fuse: *type F*
20 A / 250 V

Output data

- Test current ranges and load intervals;

| | |
|-------|--------|
| 100 A | 5 min |
| 200 A | 150 s |
| 300 A | 90 s |
| 400 A | 50 s * |
| 500 A | 30 s * |

* Available only in micro ohmmeter mode – resistance measurement

- Full Load Voltages at maximum current

| | |
|--------|--------|
| 5,95 V | @230 V |
| 5,10 V | @115 V |

Measurement

- Resistance range: 0 – 999,9 mΩ
- Resolution

| | |
|---------------------|--------|
| 0,1 μΩ – 999,9 μΩ | 0,1 μΩ |
| 1,000 mΩ – 9,999 mΩ | 1 μΩ |
| 10,00 mΩ – 99,99 mΩ | 10 μΩ |
| 100,0 mΩ – 999,9 mΩ | 0,1 mΩ |
- Typical accuracy ± (0,1 % rdg + 0,1 % FS)

Display

- LCD screen 20 characters by 4 lines;
- LCD display with backlight, visible in bright sunlight.

Interface

- USB
- Optional: RS232
- Optional: Bluetooth

Test result storage

- 500 measurements

Dimensions and weight

- 405 x 165 x 330 mm / 7.8 x 10 x 15 in
- 9 kg / 20 lbs

Environment protection

- Ingress protection rating: IP67*with closed lid

Environment conditions

- Operating temperature
20 °C - +55 °C / -4 °F - +131 °F
- Storage & transportation:
-40 °C - +70 °C / -40 °F - +158 °F
- Humidity 5 % - 95 % relative humidity

Applicable Standards

- Installation/overvoltage: category II
- Pollution: degree 2
- Safety: LVD 1006/95/EC (CE Conform)
EN 61010-1
- EMC: Directive 1004/108/EC (CE Conform)
Standard EN 61326-1:1006
- CAN/CSA-C22.2 No.61010-1, 2nd edition,
Including Amendment 1

Warranty

- 3 years

Accessories



Current cables



Extension current cables



Voltage sense cables



Current clamp 30/300A power supplied from the instrument with extension 5 m



Test shunt



Cable bag

Order info

| Instrument with included accessories | Article No |
|---|--------------|
| Ground Grid Tester GGT500 <ul style="list-style-type: none"> - DV-Win PC software including USB cable - Mains power cable - Ground (PE) cable | GGT500N-N-00 |
| Recommended accessories | Article No |
| Current cables 2 x 10 m, 50 mm ² with battery clamps | C2-10-50VMB3 |
| Heavy duty sense cables 2 x 10 m 10 mm ² with alligator clamps | S2-10-10HDA3 |
| Transport case | HARD-CASE-SC |
| Cable plastic case – medium size | CABLE-CAS-02 |
| Optional accessories | Article No |
| Test shunt 100 μΩ (600 A/60 mV) | SHUNT-600-MK |
| Current cables 2 x 5 m, 50 mm ² with battery clamps | C2-05-50VMB3 |
| Current cables 2 x 5 m 50 mm ² with C clamps | C2-05-50VMC3 |
| Current cables 2 x 10 m 50 mm ² with C clamps | C2-10-50VMC3 |
| Current cables 2 x 15 m 50 mm ² with battery clamps | C2-15-50VMB3 |
| Current cables 2 x 15 m 50 mm ² with C clamps | C2-15-50VMC3 |
| Extension cables 2 x 5 m 50 mm ² | E2-05-50VMVF |
| Extension cables 2 x 10 m 50 mm ² | E2-10-50VMVF |
| Heavy duty sense cables 2 x 5 m 10 mm ² with alligator clamps | S2-05-10HDA3 |
| Heavy duty sense cables 2 x 15 m 10 mm ² with alligator clamps | S2-15-10HDA3 |
| Remote control unit | RMORCU-09-00 |
| Remote control test probes (one with trig button) | RMO-RCTP-TB0 |
| Current clamp 30/300 A power supplied from the instrument with extension 5 m (Both Sides Grounded Unit) | CACL-0300-06 |

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