GGT series
Ground Grid Testers

- Ground Grid Integrity Test (as per IEEE 80 – 2000)
- Micro Ohmmeter with test current up to 200 A / 500 A DC
- 5 separate test modes: GROUND GRID / SINGLE / CONTIN / BSG / DTR
- Lightweight – less than 10 kg / 22 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 Testers GGT series (hereafter referred to as “GGT”) contain 2 models: GGT200 and GGT500. The main difference between these models is the maximum test current (200 A for GGT200 and 500 A for GGT500 model).

GGT is the test specially designed for inspection of substation ground grid integrity. Test is done as per IEEE 80 – 2000 standard. During a measurement the instrument generates continues current (up to 300 A / 60 s for GGT500 model and up to 200 A / 60 s for GGT200). 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.

GGT can also be used as a standard micro ohmmeter for the contact resistance measurement of non-inductive test objects. GGT generates a true DC (ripple-free) current with automatically regulated test ramps. During a test, the GGT ramps with increasing current before measuring and decreasing current after the measurement. This significantly decreases influence of the magnetic transients.

The GGT instrument can store internally up to 500 measurements. All measurements are time- and date-stamped. Using the DV-Win software a test can be controlled from the PC, with additional features of test results analysis and fully customized test reports. Communication between the GGT and PC is through an USB (as standard) or RS232 cable (as an option). The GGT instrument has 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 GGT 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

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

<table>
<thead>
<tr>
<th>Test current (A)</th>
<th>Maximum test duration time</th>
</tr>
</thead>
<tbody>
<tr>
<td>5, 10, 20, 50, 100</td>
<td>5 min</td>
</tr>
<tr>
<td>200</td>
<td>150 s</td>
</tr>
<tr>
<td>300*</td>
<td>90 s</td>
</tr>
<tr>
<td>400*</td>
<td>50 s</td>
</tr>
<tr>
<td>500*</td>
<td>30 s</td>
</tr>
</tbody>
</table>

*for GGT500 only

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:

- Substation Ground Grid Integrity (as per IEEE 80 – 2000)
- High- and medium- voltage circuit breakers (live and dead tank)
- High- and medium- voltage disconnecting switches
- Gas Isolated Switchgears (GIS)
- High-current bus bar joints
- Cable splices
- Welding joints
- Fuses
Connecting the GGT to Ground Grid

When performing a test with GGT, 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.

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 GGT

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.
Using the GGT 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 GGT 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 GGT 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 GGT.
DV-Win software

DV-Win software performs acquisition and analysis of the test results, as well as control of all the GGT functions from a PC. The DV-Win also provides several advanced features as a supplement to multiple functions of GGT 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
- Sampling time feature for CONTIN modes
Technical data

Mains power supply
- Connection according to IEC/EN60320-1; C320
- Mains supply: 90 V – 264 V AC
- Frequency: 50 / 60 Hz
- Fuse: type F
  GGT200: 10 A / 250 V
  GGT500: 20 A / 250 V

Output data
- Test current ranges and load intervals for:
  - Ground Grid test mode:
    - 100 A 5 min
    - 200 A 150 s
    - 300 A* 60 s
  - Micro Ohmmeter mode:
    - 100 A 5 min
    - 200 A 150 s
    - 300 A* 90 s
    - 400 A* 50 s
    - 500 A* 30 s
  *for GGT500 only
- Full Load Voltages at maximum current
  GGT200: 5.95 V @230 V, 5.10 V @115 V
  GGT500: 6.80 V @230 V, 5.90 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 communication
- Optional: RS232

Test result storage
- 500 measurements

Dimensions and weight
- 405 x 165 x 330 mm / 7.8 x 10 x 15 in
- GGT200: 8,5 kg / 18.7 lbs
- GGT500: 9,9 kg / 21.8 lbs

Environment protection
- Ingress protection rating: IP67* with closed lid

Environment conditions
- Operating temperature
  20 ºC - +55 ºC / -4 ºF - +131 ºF
- Storage & transportation:
  -40 ºC - +70 ºC / -40 ºF - +158 ºF
- Humidity 5 % - 95 % relative humidity

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

Warranty
- 3 years

All specifications herein are valid at ambient temperature of + 25 ºC and recommended accessories. Specifications are subject to change without notice.
## Accessories

![Current cables](image1)
![Extension current cables](image2)
![Voltage sense cables](image3)

- Current clamp 30/300A power supplied from the instrument with extension 5 m
- Test shunt
- Cable case

### Current cables
- Extension current cables
- Voltage sense cables

### Instrument with included accessories

<table>
<thead>
<tr>
<th>Ground Grid Tester GGT</th>
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</thead>
<tbody>
<tr>
<td>DV-Win PC software including USB cable</td>
</tr>
<tr>
<td>Mains power cable</td>
</tr>
<tr>
<td>Ground (PE) cable</td>
</tr>
<tr>
<td>Transport case</td>
</tr>
<tr>
<td>Article No</td>
</tr>
<tr>
<td>GGT200N-N-01</td>
</tr>
<tr>
<td>GGT500N-N-01</td>
</tr>
</tbody>
</table>

### Recommended accessories

| Current cables 2 x 10 m, 50 mm² with battery clamps *for GGT500 |
| Current cables 2 x 10 m, 25 mm² with battery clamps *for GGT200 |
| Heavy duty sense cables 2 x 10 m 10 mm² with alligator clamps |
| Cable plastic case – medium size |
| Article No |
| C2-10-50VMB3 |
| C2-10-25LMB1 |
| S2-10-10HDA3 |
| CABLE-CAS-02 |

### Optional accessories

| Test shunt 100 µΩ (600 A/60 mV) |
| Current cables 2 x 15 m 35 mm² with battery clamps (B3) *for GGT200 |
| Current cables 2 x 15 m 50 mm² with battery clamps (B3) *for GGT500 |
| Current cables 45 m and 15 m 50 mm² with battery clamps (B3) |
| Current cables 50 m and 10 m 50 mm² with battery clamps (B3) |
| Current cables 45 m and 15 m 70 mm² with battery clamps (B3) |
| Current cables 50 m and 10 m 70 mm² with battery clamps (B3) |
| Current cables 2 x 5 m 50 mm² with C3 clamps |
| Current cables 2 x 10 m 50 mm² with C3 clamps |
| Current cables 2 x 15 m 50 mm² with C3 clamps |
| Cable plastic case – large size |
| Cable plastic case with wheels - large size |
| Cable bag |
| Transport case |
| Remote control unit + cable set |
| Remote control test probes (with trigger button) |
| Extension cables 2 x 5 m 50 mm² |
| Extension cables 2 x 10 m 50 mm² |
| Heavy duty sense cables 2 x 5 m 10 mm² with alligator clamps (A3) |
| Heavy duty sense cables 2 x 15 m 10 mm² with alligator clamps (A3) |
| Article No |
| SHUNT-600-MK |
| C2-15-35LMB3 |
| C2-15-50VMB3 |
| C-4515-50VMB3 |
| C-5010-50VMB3 |
| C-4515-70VMB3 |
| C-5010-70VMB3 |
| C2-05-50VMC3 |
| C2-10-50VMC3 |
| C2-15-50VMC3 |
| CABLE-CAS-03 |
| CABLE-CAS-W3 |
| CABLE-BAG-00 |
| HARD-CASE-SC |
| RMORCU-09-00 |
| RMO-RCTP-TB0 |
| E2-05-50VMVF |
| E2-10-50VMVF |
| S2-05-10HDA3 |
| S2-15-10HDA3 |

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