

GGT series

Ground Grid Testers

- Ground Grid Integrity Test (as per IEEE 80)
- Micro Ohmmeter (test current up to 200 A/300 A)
- Lightweight – less than 15 kg / 33 lbs
- Measuring range: 0 – 999,9 mΩ
- Best resolution: 0,1 μΩ
- Wireless remote control module (GGT-M)
- Typical accuracy $\pm (0,1 \% \text{ rdg} + 0,1 \% \text{ FS})$
- Testing Both Sides Grounded (BSG) Circuit Breakers



Description

Ground Grid Testers – GGT series (hereafter referred to as “GGT”) contain two models, **GGT200** and **GGT300**. The main difference between these models is the maximum test current (200 A for GGT200 and 300 A for the GGT300 model).

GGT is the test set specially designed for inspection of the substation ground grid integrity. The test is done as per IEEE 80. During a measurement, the instrument generates continuous current (up to 300 A / 60 s for GGT300 model and up to 200 A / 60 s for GGT200). During the test, current and voltage drops are measured and displayed simultaneously. The voltage drop between two measurement points (red and black clamps) is the main parameter that should be checked. The voltage drop on the current cables does not affect this parameter, since it is measured directly using the voltage sense cables.

The test can be controlled remotely by the battery-operated GGT-M module that has wireless communication (RF) with GGT main unit. The GGT-M module also enables current flow inspection, by using the current clamps for measurement of the “DOWN” current parameter.

GGT can also be used as a micro-ohmmeter for the contact resistance measurement of non-inductive test objects. GGT generates a true DC (ripple-free) current up to 300 A (for the GGT300 model), with automatically regulated test ramps. This significantly decreases the influence of 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 a USB (as standard), or RS232/Bluetooth (as an option).

Instead of thermal fuses, the GGT devices are now provided with the circuit breaker with thermal overload protection - 20A/240V AC.

The GGT instrument has five separate test modes:

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

Ground Grid Integrity Test

The best way to check the integrity (continuity) of the ground grid is to use a high but practical current and to record the voltage drop caused by this current.

During the test, the following parameters should be checked:

- **Voltage drop**

When 300A is passing through the ground grid between a reference point and the ground point under test, the acceptable voltage drop should rise approximately 1.5 V for each 50 ft. (15,24 m) of straight distance from the reference point. Voltage drop higher than 1,5 V indicates a potential bad ground connection.

- **Current flow inspection**

The current measurement is done by the current clamps connected to GGT-M module (Figure 2).

- For single grounding connection, "DOWN" current can be considered satisfactory if the voltage drop is in line as explained above and at least 200A flows to the ground conductor (300A is a total generated current).
- For the equipment in substation with multiple grounds, a ground can be considered satisfactory if the voltage drop is in line as explained above and at least 150A flows to the ground conductor (300A is a total generated current).

Note: These are only guidelines, and each ground should be inspected subjectively on its regulations and standards.

- **Inspection of the resistance values**

In such cases when the instrument cannot generate the selected current (e.g., 300A), because of the high burden, then the calculated resistance values can also be used for the analysis.

The GGT-M module besides the current and voltage values is also displaying the resistance values calculated by using the total generated current and current recorded by current clamps.

These values can be compared with the obtained resistance values from the previous testing or with the expected values, or to compare the results between the test risers and search for those with abnormally high resistance values.

The objective is to determine whether the equipment, frames, structures, etc. are connected properly to the ground grid with very low resistance (less than a couple of mOhm).

GGT-M Module

The GGT-M module is specially designed for the GGT instrument and can be used during the substation ground grid integrity test. It has wireless communication and allows remote control of the GGT from a long distance in substation.

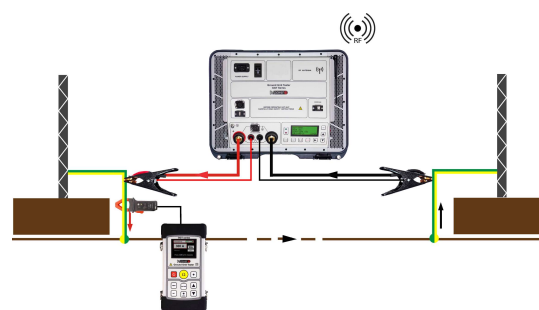


Figure 2. GGT-M module application

Using GGT as Micro-ohmmeter

GGT can also be used as a powerful micro-ohmmeter for the contact resistance measurement of non-inductive test objects. The GGT generates a true DC (ripple-free) current up to 200 A (GGT200) or 300 A (GGT300), with automatically regulated test ramps.

Connecting the GGT to Test Object

The connection diagram for contact resistance measurement (e.g., a micro-ohmmeter function of GGT) corresponds to Kelvin's (four-point) measurement principle.

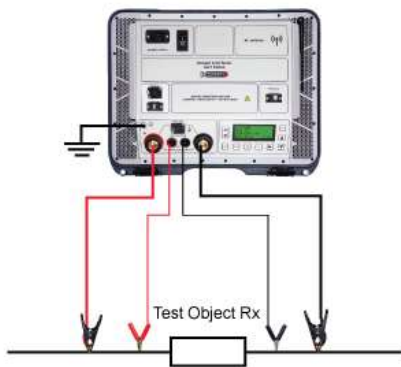


Figure 3. Connecting GGT to test object

The connection to the live tank circuit breakers is presented in the following figure:

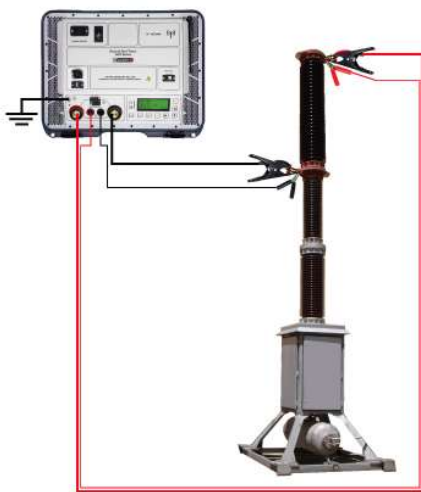
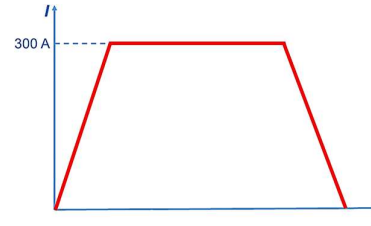


Figure 4. GGT connection on live-tank circuit breaker

Single Test

The GGT instrument generates a filtered (true ripple-free) DC current up to 200 A/300 A 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 300 A current.



Continuous Test

The GGT 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, 200 | Unlimited |
| 300* | **10 min |

*Available for GGT300 model only

**In Ground Grid Mode, max. test duration at 300 A is 60 s

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

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 during contact resistance measurement (micro-ohmmeter use of GGT).

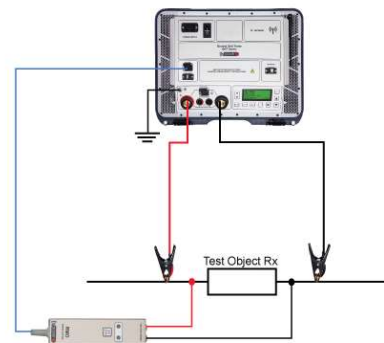


Figure 5. Connecting remote control unit to GGT

BSG test

Grounding circuit breakers from both sides provide increased safety for testing personnel compared with only one-side grounding method.

The BSG test mode within GGT allows contact resistance measurement of the CBs while grounded from both sides.

A special current clamp supplied with the instrument are used to measure the current through the groundings which will be added to the output test current.

The test setup is very simple (same as for the SINGLE test), and all calculations are made automatically by the device's internal algorithm.

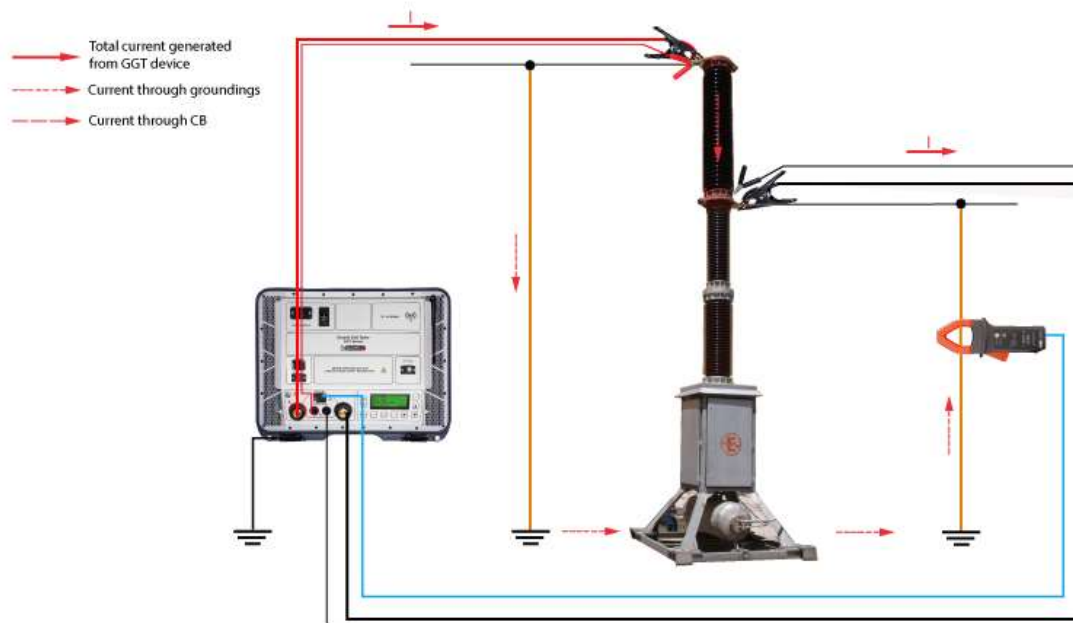


Figure 6. GGT cable connection during BSG testing

DTR test

The presence of a current transformer (CT) inside 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's core before measurement.

DTR test mode is specially designed for resistance measurement of dead tank circuit breakers.

Calculations for detecting the saturated condition of a CT are done by an internal algorithm. The process of setting the 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).

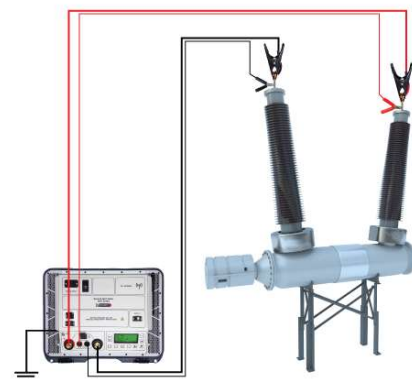


Figure 7. GGT cable connection on dead tank circuit breaker

Technical data

Mains power supply

- Connection according to IEC/EN60320-1; C320
- Mains supply: 90 V – 264 V AC
- Frequency: 50 / 60 Hz
- Circuit Breaker with thermal overload protection - 20A/240V AC
 - Designed according to UL 1077 standard (Supplementary Protectors for Use in Electrical Equipment)
 - For primary protection of the electrical panel, a circuit breaker according to the UL 489 standard shall be used

Output data

- Test current ranges and load intervals:

| | |
|-------------|--------------------------|
| up to 200 A | unlimited test time |
| 300 A* | 10 min maximum test time |

**Available with GGT300 model*
- Full Load Voltages:

| Main supply voltage | Output current | Maximum output voltage |
|---------------------|----------------|------------------------|
| 230 V AC | 300 A | 8,2 V DC |
| | 200 A | 8,6 V DC |
| 115 V AC | 300 A | 7,2 V DC |
| | 200 A | 7,5 V DC |

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

Test result storage

- 500 measurements
- USB flash drive feature

Interface

- USB communication with PC
- Optional: RS232 and Bluetooth
- Wi-Fi (RF) communication between GGT device and GGT-M module

Dimensions and weight

- GGT200 & GGT300 dimensions: 503 x 406 x 193 mm / 19.8 x 15.9 x 7.6 in
- GGT-M module dimensions: 226 x 116 x 50 mm / 8.9 x 4.5 x 1.9 in
- GGT200 & GGT300 devices weight: 14,6 kg / 32.1 lbs
- GGT-M module weight: 0,95 kg / 2.1 lbs

Environment protection

- Ingress protection rating:
 - GGT200 & GGT300: IP67 with closed lid
 - GGT-M module: IP40

Environment conditions

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

Applicable Standards

- Installation/overvoltage: category II
- Pollution: degree 2
- Safety: LVD 2014/35/EU (CE Conform) EN 61010-1
- EMC: Directive 2014/30/EU (CE Conform) Standard EN 61326-1:2006
- CAN/CSA-C22.2 No.61010-1, 2nd edition, Including Amendment 1

Warranty

- 3 years + additional 1 (one) year upon registration on DV Power official website (www.dv-power.com)

All specifications herein are valid at ambient temperature of + 25 °C and standard accessories. Specifications are subject to change without notice.

Accessories



Alligator clamps red/black



Current and sense cables



Voltage sense cables



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



Test shunt



Cable case

GGT models selection



GGT200 device

Maximum test current:

- Ground grid testing: 200 A
- Micro-ohmmeter: 200 A

RF communication with antenna installed for communication with GGT-M:

- YES

Weight:

- 14,6 kg / 32.1 lbs

Standard cables:

- 2 x 10 m, 50 mm² cables

GGT300 device

Maximum test current:

- Ground grid testing: 300 A
- Micro-ohmmeter: 300 A

RF communication with antenna installed for communication with GGT-M:

- YES

Weight:

- 14,6 kg / 32.1 lbs

Standard cables:

- 2 x 10 m, 70 mm² cables

GGT-M module



- Wireless (RF) communication with GGT200 and GGT300 devices
- Setting the test parameters for ground grid testing:
 - Test current value
 - Test duration
 - Memory location
- Built-in Li-Po battery
- LED & Buzzer indication during testing
- LED indication during battery charging
- Current clamp input (current clamps on GGT-M are used for measurement of the "DOWN" current)
- Weight: 0,95 kg / 2.1 lbs

Order info

| GGT300 instrument with included accessories | Article No |
|--|----------------|
| Ground Grid Tester GGT300 <ul style="list-style-type: none"> - DV-Win PC software including USB cable - Mains power and ground (PE) cable - Plastic transport case | GGT300-N0-03 |
| GGT200 instrument with included accessories | Article No |
| Ground Grid Tester GGT200 <ul style="list-style-type: none"> - DV-Win PC software including USB cable - Mains power and ground (PE) cable - Plastic transport case | GGT200-N0-03 |
| GGT-M module with included accessories | Article No |
| Ground Grid Module for Remote Control GGT-M <ul style="list-style-type: none"> - Power supply adapter 3 A - Transport bag and carrying belts | GGTMRC-MOD-0 |
| Standard accessories | Article No |
| Current cables 2 x 10 m 70 mm ² and heavy-duty sense cables 2 x 10 m * | CSHD-10-70VMFM |
| Current cables 2 x 10 m 50 mm ² and heavy-duty sense cables 2 x 10 m * | CSHD-10-50VMFM |
| Current and sense cables 2 x 35 cm 70 mm ² with alligator clamps (A4) * | CS-0Z35-70VMA4 |
| Current and sense cables 2 x 35 cm 50 mm ² with alligator clamps (A4) * | CS-0Z35-50VMA4 |
| Sense cables with test probes ** | S2-0122-BPTP |
| Current clamp 30/300 A power supplied from the instrument with 5 m cable ** | CCCA-0300-01 |
| Cable plastic case – medium size *** | CABLE-CAS-02 |
| Cable plastic case – large size **** | CABLE-CAS-03 |
| Optional accessories | Article No |
| Current cables 2 x 5 m 70 mm ² and heavy-duty sense cables 2 x 5 m * | CSHD-05-70VMFM |
| Current cables 2 x 5 m 50 mm ² and heavy-duty sense cables 2 x 5 m * | CSHD-05-50VMFM |
| Red current cable extension 20 m 70 mm ² and sense cable 20 m * | RECS-20-70VMFM |
| Red current cable extension 20 m 50 mm ² and sense cable 20 m * | RECS-20-50VMFM |
| Remote control unit + cable set | RMORCU-09-00 |
| Remote control test probes (with trigger button) | RMO-RCTP-TB0 |
| Test shunt 100 $\mu\Omega$ (600 A/60 mV) | SHUNT-600-MK |
| Cable plastic case with wheels – large size | CABLE-CAS-W3 |
| Current and sense cables 2 x 35 cm 70 mm ² with battery clamps (B3) * | CS-0Z35-70VMB3 |
| Current and sense cables 2 x 35 cm 50 mm ² with battery clamps (B3) * | CS-0Z35-50VMB3 |
| Cable plastic case with wheels – extra-large size | CABLE-CAS-W4 |
| Current and sense cables 2 x 35 cm 70 mm ² with C clamps * | CS-0Z35-70VMC0 |
| Current and sense cables 2 x 35 cm 50 mm ² with C clamps * | CS-0Z35-50VMC0 |
| Sense cables 2 x 1 m with alligator clamps (A2) | S2-01-02BPA2 |

* 70 mm² current cables are for GGT300 and 50 mm² current cables are for GGT200

** For GGT-M module

*** For GGT200's standard accessories

**** For GGT300's standard accessories

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Subject to change without notice.

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