

GGT series

Ground Grid Testers

- Ground Grid Integrity Test (as per IEEE 80 – 2000)
- Micro Ohmmeter (test current up to 200 A / 500 A)
- Lightweight – less than 10 kg / 22 lbs
- Measuring range: 0 – 999,9 mΩ
- Best resolution: 0,1 μΩ
- Wireless remote control module (GGT-M)
- Typical accuracy ± (0,1 % rdg + 0,1 % FS)
- Testing 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 set specially designed for inspection of substation ground grid integrity. Test is done as per IEEE 80 – 2000 standard. During a measurement the instrument generates continuous 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 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 do not affect this parameter, since is automatically excluded from the result by measurement algorithm.

The test can also be controlled remotely by the battery-operated GGT-M module that has wireless communication 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 500 A (for GGT500 model), with automatically regulated test ramps. 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:

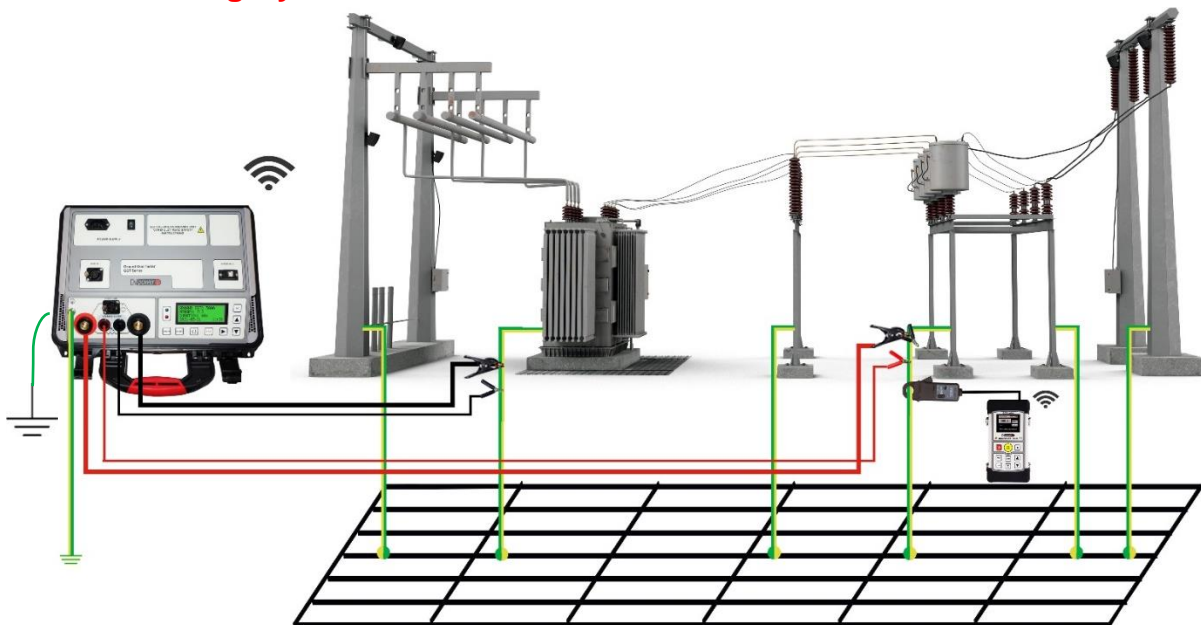
- Ground Grid mode
- SINGLE mode
- CONTIN mode
- BSG (*Both Sides Grounded*) mode
- DTR (*Dead Tank Resistance*) test mode

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

Ground Grid Integrity Test



GGT cable connection for ground grid test

When performing a test with GGT, a single pair of current cables should be used. The black marked cable (e.g. 10 m / 33 ft.) is connected to the reference grounding point in the substation (e.g. transformer grounding). The red marked current cable (e.g. 45 m / 150 ft.) is connected to the substation ground point under test.

The resistance of the current cables can be checked prior or during the testing (e.g. in case of significant change of the ambient temperature). This value is automatically excluded from the measurement result by internal algorithm.

Since an operator needs to check several ground points, it is very practical to use the GGT-M module for setting/changing the test parameters and remote control of the test.

The test is performed by injecting continuous DC current by the GGT main unit.

During the test, two parameters should be checked:

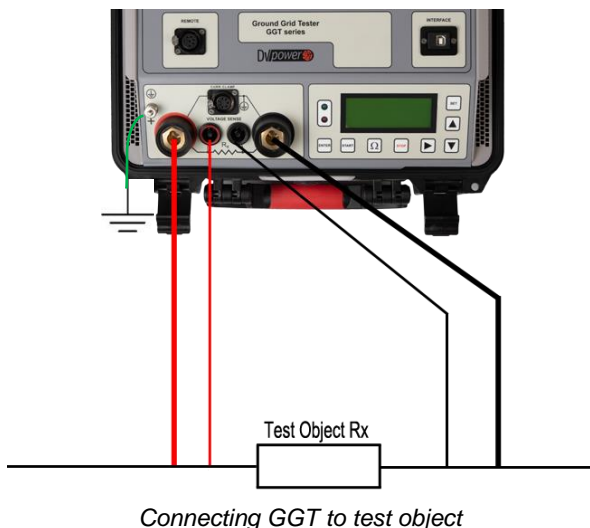
- **Voltage drop between the referent point (black clamps) and the test point (red clamps).** Criteria for determining condition of the tested grounding depend on what are we testing. As a reference, for copper-based groundings the acceptable voltage drop at 50 ft. (15,24 m) distance @300 A is up to 1 V, while voltage drop of 1,5 V or higher is considered as too high.
- **Current flow inspection at the inspected grounding point** (e.g. measurement of the current below the red clamps connection point - “DOWN” current. The measurement is done by the current clamp connected to GGT-M module). For single grounding connection, “DOWN” current should be $\geq \frac{1}{2} I_T$ (total generated current). In case of multiple ground connections, it is okay that more than half of groundings point complies with these criteria.

Using GGT as a 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 500 A (GGT500), with automatically regulated test ramps.

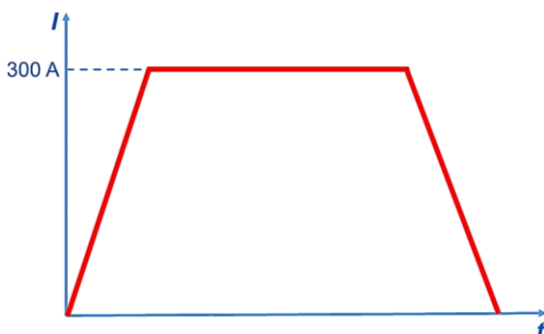
Connecting the Test Object to GGT

The connection diagram for contact resistance measurement (e.g. micro-ohmmeter function of GGT) 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.

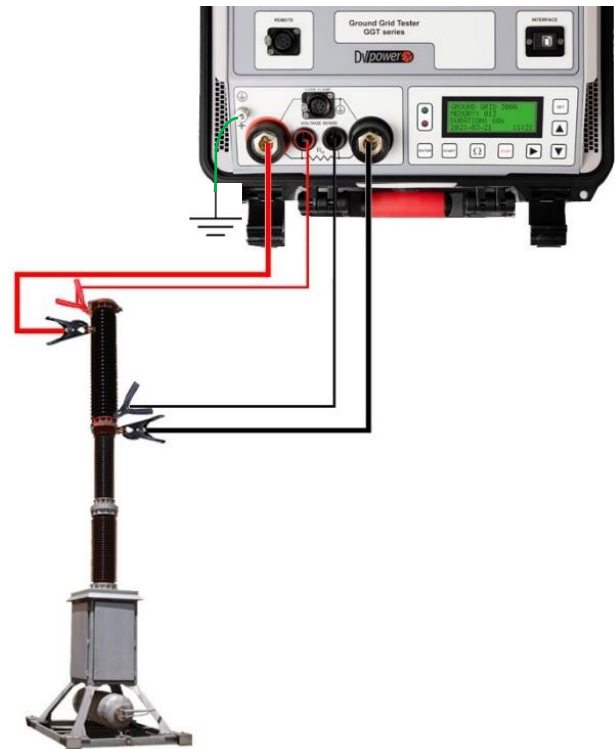


Single Test

The GGT instrument generates a filtered (true ripple-free) DC current up to 200 A/500 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.



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



GGT cable connection on live-tank circuit breaker

Continuous Test

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	Unlimited
200	150 s
300*	**90 s
400*	50 s
500*	30 s

*Available for GGT500 model only

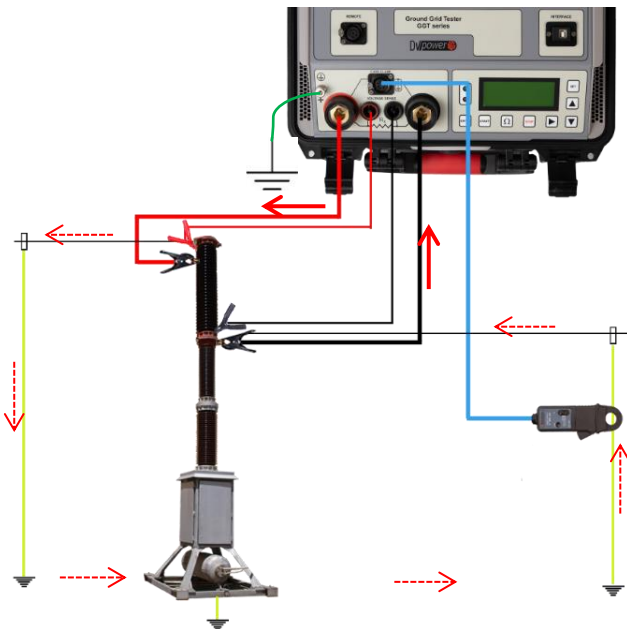
**In Ground Grid test, max. test duration at 300 A is 60 s

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



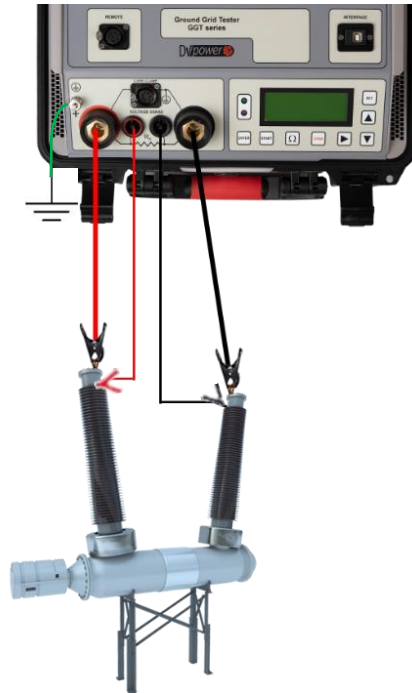
GGT cable connection during BSG testing

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.

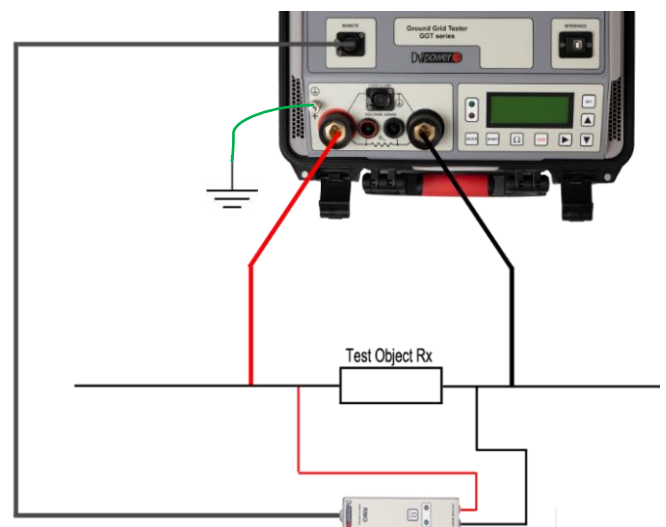
Calculations to detect saturated condition of a CT are done by internal algorithm. Accordingly, the process of setting measurement parameters and testing in this mode is very simple and does not differ much from live-tank circuit breaker testing (in SINGLE / CONTIN test modes).



GGT cable connection on dead-tank circuit breaker

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)



Connecting remote control to 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

The screenshot displays the DV-Win software interface. The main window shows a 'Welcome back!' message and a grid of six buttons: 'Start new test', 'Analyze your results', 'Manage test plans', 'Create reports', 'Adjust settings', and 'About?'. A sidebar on the left contains navigation options: Home, New test, Results analysis, Test plans, Reports, Demo, Settings, and About.

Overlaid on the bottom right is a 'Test report' window. It features a sidebar with sections for 'Report sections', 'Customer info', 'Company information', and 'Note'. The main area of the report window contains a table with the following data:

Item	Item name	Unit	Value	Min	Max	StdDev	Min/Max	Min/Max	Min/Max	Min/Max	Min/Max	Min/Max
1	280219 4800 (Hz)	Hz	137898.82	0	0	1460	4407.81	-	-	-	-	-
2	280219 4810 (Hz)	Hz	128633.07	0	0	2411	4408.64	-	-	-	-	-
3	280219 4820 (Hz)	Hz	127806.62	0	0	8495	4413.84	-	-	-	-	-
4	280219 4830 (Hz)	Hz	127349.41	0	0	3487	4420.87	-	-	-	-	-
5	280219 4840 (Hz)	Hz	116368.84	0	0	2341	4428.82	-	-	-	-	-
6	280219 4850 (Hz)	Hz	81.07	0	0	101.9	15.17	-	-	-	-	-
7	280219 4860 (Hz)	Hz	21.08	0	0	101.9	15.17	-	-	-	-	-
8	280219 4870 (Hz)	Hz	149.41	0	0	101.9	15.18	-	-	-	-	-
9	280219 4880 (Hz)	Hz	119.12	0	0	101.9	15.18	-	-	-	-	-
10	280219 4890 (Hz)	Hz	276.52	0	0	101.9	15.18	-	-	-	-	-
11	280219 4900 (Hz)	Hz	232.22	0	0	101.9	15.18	-	-	-	-	-
12	280219 4910 (Hz)	Hz	249.81	0	0	101.9	15.18	-	-	-	-	-
13	280219 4920 (Hz)	Hz	199.87	0	0	101.9	15.18	-	-	-	-	-
14	280219 4930 (Hz)	Hz	149.71	0	0	101.9	15.18	-	-	-	-	-
15	280219 4940 (Hz)	Hz	99.84	0	0	101.9	15.17	-	-	-	-	-
16	280219 4950 (Hz)	Hz	49.86	0	0	101.9	15.17	-	-	-	-	-
17	280219 4960 (Hz)	Hz	149.76	0	0	101.9	15.18	-	-	-	-	-
18	280219 4970 (Hz)	Hz	199.86	0	0	101.9	15.18	-	-	-	-	-
19	280219 4980 (Hz)	Hz	249.99	0	0	101.9	15.18	-	-	-	-	-

Technical data

Mains power supply

- Connection according to IEC/EN60320-1; C320
- Mains supply: 90 V – 264 V AC
- Frequency: 50 / 60 Hz

Output data

- Test current ranges and load intervals for:
 - Ground Grid test mode:

100 A	Unlimited
200 A	150 s
300 A*	60 s
 - Micro Ohmmeter's mode (CONTIN mode):

100 A	Unlimited
200 A	150 s
300 A*	90 s
400 A*	50 s
500 A*	30 s

*available at GGT500 model only

- Full Load Voltages:

Main supply voltage	Output current	Maximum output voltage
230 V AC	300 A	7,8 V DC
	200 A	8,4 V DC
120 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

Interface

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

Dimensions and weight

- GGT200 & GGT500 dimensions: 405 x 165 x 330 mm / 7.8 x 10 x 15 in
- GGT-M module dimensions: 226 x 116 x 50 mm / 8.9 x 4.5 x 1.9 in
- GGT200 & GGT500 devices weight: 9,9 kg / 21.8 lbs
- GGT-M module weight: 0,95 kg / 2.1 lbs

Environment protection

- Ingress protection rating:
 - GGT200 & GGT500: IP67*with closed lid
 - GGT-M module: IP54

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 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 recommended accessories. Specifications are subject to change without notice.

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 case

GGT models selection



GGT200 device

Maximum test current:

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

Wireless connectivity with GGT-M:

- YES

Weight:

- 9,9 kg / 21.8 lbs

Recommended accessories:

- 2 x 10 m, 25 mm² cables

GGT500 device

Maximum test current:

- Ground grid testing: 300 A
- Micro-ohmmeter: 500 A

Wireless connectivity with GGT-M:

- YES

Weight:

- 9,9 kg / 21.8 lbs

Recommended accessories:

- 2 x 10 m, 50 mm² cables

GGT-M module

- Wireless connectivity with GGT200 and GGT500 devices
- Setting the test parameters for ground grid testing:
 - Test current value
 - Test duration
 - Memory location
- Built-in Li-Po battery
- Built-in SD card for memory storage
- 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

GGT500 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 - Transport case 	GGT500N-N-01
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 cable - Ground (PE) cable - Transport case 	GGT200N-N-01
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
Recommended accessories	Article No
Current cables 2 x 10 m, 50 mm ² with battery clamps <i>*for GGT500</i>	C2-10-50VMB3
Current cables 2 x 10 m, 25 mm ² with battery clamps <i>*for GGT200</i>	C2-10-25LMB1
Heavy duty sense cables 2 x 10 m 10 mm ² with alligator clamps	S2-10-10HDA3
Voltage sense cables <i>*for GGT-M</i>	S2-0122-BPBP
Current clamp 30/300 A power supplied from the instrument with 5 m extension <i>*for GGT-M</i>	CACL-0300-10
Cable plastic case – medium size	CABLE-CAS-02
Optional accessories	Article No
Current cables 2 x 15 m 35 mm ² with battery clamps (B3) <i>*for GGT200</i>	C2-15-35LMB3
Current cables 2 x 15 m 50 mm ² with battery clamps (B3) <i>*for GGT500</i>	C2-15-50VMB3
Current cables 45 m and 15 m 35 mm ² with battery clamps (B3) <i>*for GGT200</i>	C-4515-35VMB3
Current cables 45 m and 15 m 50 mm ² with battery clamps (B3)	C-4515-50VMB3
Current cables 50 m and 10 m 50 mm ² with battery clamps (B3)	C-5010-50VMB3
Current cables 45 m and 15 m 70 mm ² with battery clamps (B3)	C-4515-70VMB3
Current cables 50 m and 10 m 70 mm ² with battery clamps (B3)	C-5010-70VMB3
Current cables 2 x 5 m 50 mm ² with C3 clamps	C2-05-50VMC3
Current cables 2 x 10 m 50 mm ² with C3 clamps	C2-10-50VMC3
Current cables 2 x 15 m 50 mm ² with C3 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
Test shunt 100 µΩ (600 A/60 mV)	SHUNT-600-MK
Cable plastic case – large size	CABLE-CAS-03
Cable plastic case with wheels – large size	CABLE-CAS-W3
Cable bag	CABLE-BAG-00
Transport case	HARD-CASE-SC
Remote control unit + cable set	RMORCU-09-00
Remote control test probes (with trigger button)	RMO-RCTP-TB0
Heavy duty sense cables 2 x 5 m 10 mm ² with alligator clamps (A3)	S2-05-10HDA3
Heavy duty sense cables 2 x 15 m 10 mm ² with alligator clamps (A3)	S2-15-10HDA3