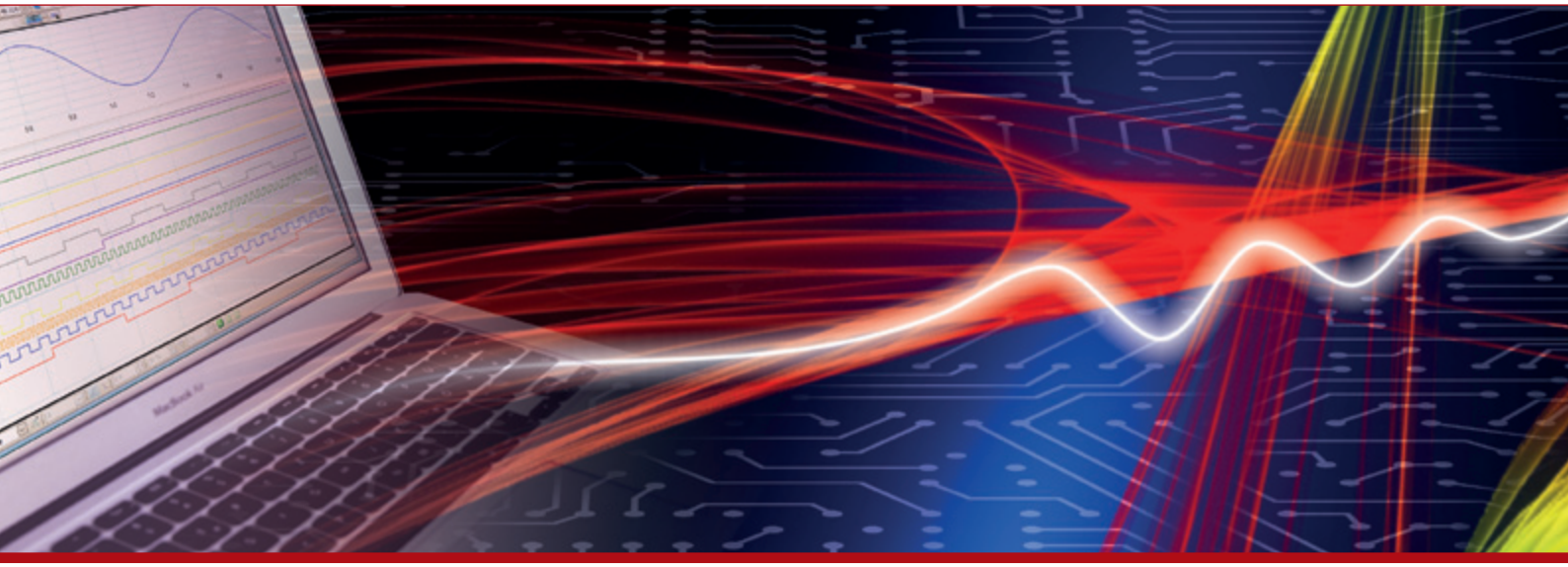
Product Datasheet - Technical Specifications



More information in our Web-Shop at ▸ **www.meilhaus.com**

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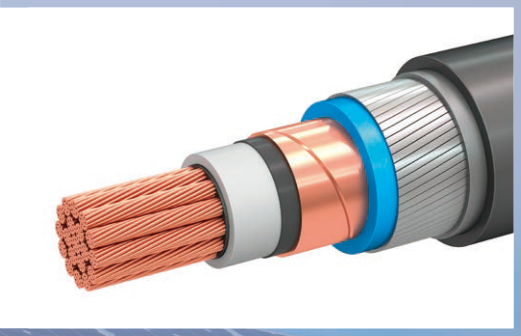
HIOKI

HIGH VOLTAGE INSULATION TESTER
IR5050, IR5051

NEW



5 kV Insulation Resistance Meter

Stable measurement in a compact, lightweight package

IR5051

2000 V solar power system compatible

Measure insulation resistance while the system continues to generate

CE

3 year Warranty

Bluetooth® When Z3210 is installed

Wireless Adapter Compatible

CAT III 2000 V

CAT IV 1000 V

Accurate, easy-to-use insulation resistance meter

01 Settings

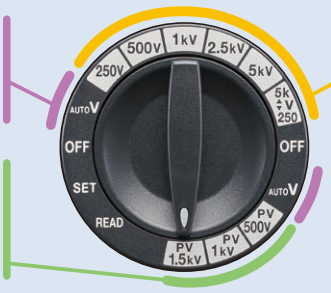
Choose the output voltage ▶ Rotary knob

Voltage measurement

1000 V AC, 2000 V DC
(automatic AC/DC detection)

PV insulation resistance measurement (IR5051 only)

Output voltage ranges:
500 V, 1 kV, 1.5 kV



Insulation resistance measurement

Output voltage ranges:
250 V, 500 V, 1 kV, 2.5 kV, 5 kV

Fine-grained output voltage configuration

The output voltage can also be set in 10 V or 25 V increments. An output voltage of up to 2 kV can be set for PV insulation resistance measurement using this function. (PV insulation resistance measurement is only available on the IR5051.)

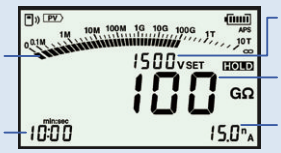
02 Measurement

Start test ▶ Automatic discharge begins right after measurement

Press and hold for 1 sec. to start measurement. This feature helps prevent inadvertent activation of a high voltage.

To encourage caution, the MEASURE button flashes when a high voltage is being generated or discharged.

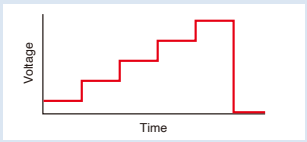
Screen during testing



- Resistance gauge — Insulation resistance value variations are displayed visually.
- Test time
- Applied voltage value
- Insulation resistance value
- Leakage current value

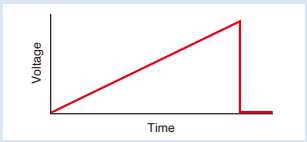
Insulation diagnostics function

After measurement completes, the instrument can display more than just the insulation resistance and leakage current, but also judgement index values of PI, DD, and DAR. It calculates these indexes based on the measured values and displays it as a pass/fail judgment.



Step voltage (SV)

Increase test voltage across 5 stages.

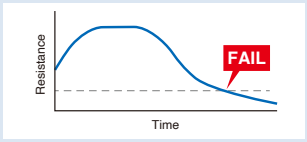


Ramp voltage (ramp)

Increase the test voltage continuously.

Timer

Stop testing automatically after the set time has elapsed.



Comparator

Generate pass/fail judgments using a threshold for insulation resistance values.

Insulation diagnostic indexes

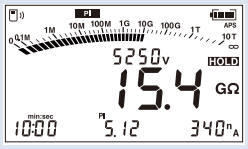
After measurement completes, the instrument can display not only the insulation resistance and leakage current, but also the insulation diagnostic index value. It calculates the value based on the measured value once a predetermined interval has elapsed and displays it as a pass/fail judgment criterion for insulation.

PI (polarization index), DAR (dielectric absorption ratio)

Both of these indicate the extent of change over time in the insulation resistance after applying the test voltage. These indexes are used to determine whether the insulation has degraded. DAR is used when the measured value stabilizes within 1 min., while PI is used when it takes longer.

$$PI \text{ or } DAR = \frac{t_2 \text{ resistance value}}{t_1 \text{ resistance value}}$$

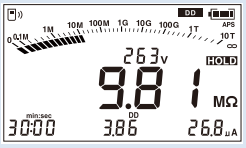
PI: t_1 = 30 sec. to 1 min.; t_2 = 3 min. to 10 min.
DAR: t_1 = 15 sec. to 30 sec.; t_2 = 30 sec. to 1 min.



DD (dielectric discharge)

This index can be used to diagnose multilayer insulators. The value is calculated from the test voltage that is applied to the measurement target, the target's capacitance value, and the discharge current remaining 1 min. after the test voltage stops.

$$DD = \frac{\text{Current value after 1 min. (nA)}}{\text{Test voltage (V)} \times \text{capacitance (μF)}}$$



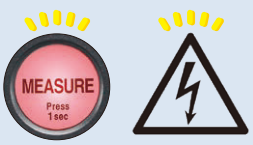
Capacitance

The capacitance value can be displayed on the hold screen after the testing completes.

Auto-discharge

After testing completes, any residual charge in the circuit under measurement is automatically discharged.

Measurement targets with a capacitance component may retain a high-voltage charge following measurement of insulation resistance, posing a hazard. The IR5050 and IR5051 start discharging automatically when testing completes. The MEASURE button and discharge-mark on the LCD display flash during discharge operation until the circuit finishes discharging (when the residual voltage is 30 V or less).



03 Recording

Record measurement data ▶ Report creation has never been easier

Send data via Bluetooth while making measurements

Using the Wireless Adapter Z3210

Use GENNECT Cross[1], a free app from Hioki, to send data to a smartphone or tablet. You can write a chart (with a minimum sampling interval of 1 sec.) while making measurements.

GENNECT Cross

Transfer data using via after measurement

Using the DMM Communicator DT4900-01

Transfer measured values and logging data saved on the instrument to a PC. This function requires Sequence Maker[2], a free Excel add-in.

Number of data points recorded by instrument: 1000
Minimum logging interval: 5 sec.

Sequence Maker

1. GENNECT Cross is a free app. The iOS version can be downloaded from the App Store®, while the Android version can be downloaded from Google Play™. Search for "GENNECT Cross" on Google Play™ or the App Store®.
2. Sequence Maker is an Excel add-in that Hioki provides free of charge. Please visit its special mini-site to learn more or download the tool. You can find the site by searching for "Sequence Maker."

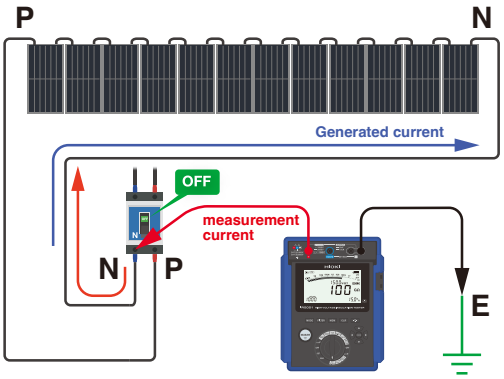
Identify panels with ground faults in 2000 V solar power systems

IR5051 only: measures PV insulation resistance while the system continues to generate

01 Measure the insulation resistance of operating strings

PV insulation resistance measurement function (IR5051 only)

In the past, it was impossible to measure a PV system's insulation resistance while the system was operating because the measurement current and generated current would mix together. Consequently, it was necessary to make such measurements at night, when the system being measured was not generating electricity. The IR5051 has a PV insulation resistance measurement function. This function can measure PV systems while they're operating during daylight hours, without being affected by the generated current. It can be used to measure PV systems of up to 2,000 V.

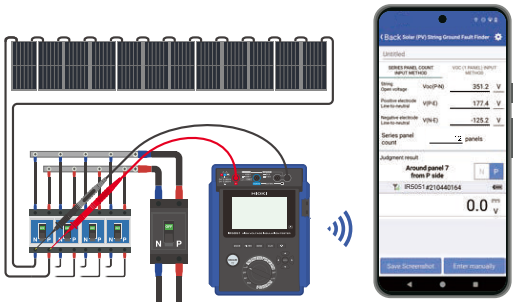


Measurement procedure

1. Disconnect from the power system with the breaker.
2. Measure the insulation resistance between N and E.
3. If there's no issue with the insulation resistance between N and E, measure the insulation resistance between P and E.
4. Reconnect to the power system with the breaker.

02 Identify solar panels with ground faults simply by measuring voltage

GENNECT Cross



With this function, you can find a solar panel with a ground fault. You'll most likely do this after finding an insulation failure on your solar string. By measuring the voltage at the disconnect switch and sending it to GENNECT Cross, the software will locate the panel with the ground fault. The IR5051 used for this can safely and accurately measure voltages of up to 2,000 V DC.

03 Create reports in the field

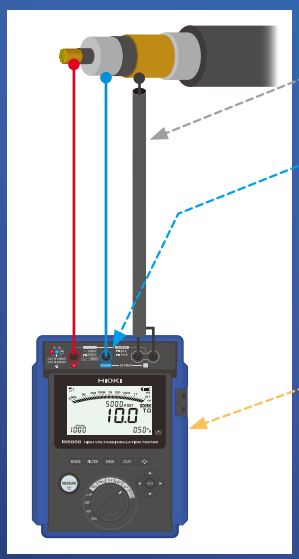
GENNECT Cross

Please see the GENNECT Cross website for more information.

GENNECT Cross can be used to create reports in the field. You can photograph a junction box and then place measured values on the image. In this way, you can create images that visually tie together the measurement values to their locations.

Features

Functions and performance for stable measurement



Shielded wire

The instrument ships standard with shielded wires that minimize measurement variability.

GUARD terminal

The GUARD terminal minimizes the effects of leakage current flowing through the insulator's surface.

Filter function

The filter function stabilizes measured values by rejecting signals that vary abruptly due to noise or other factors. (The filter can be switched on or off as desired.)

Inductive noise rejection function

This function rejects inductive noise up to 3 mA.

Minuscule current measurement technology

Proprietary measurement technology facilitates stable measurement of even minuscule currents (minimum range: 10 nA).

Dustproof & waterproof case for outdoor work

The Carrying Case C0102 is a rigid case with IP65 dust and water protection. It provides space for the insulation resistance meter and test leads so that they can be transported easily.

Compatible with store-bought rechargeable batteries, which are both economical and environmentally friendly

You can power the instrument with either AA alkaline batteries or store-bought nickel-metal hydride (NiMH) batteries. In this way, the design is both environmentally friendly and economical. Each battery change is good for at least 200 measurements (or at least 1000 measurements if using PV insulation resistance measurement).

General specifications

Operating environment		Indoors, up to 2,000 m (6,562.20 ft.)
Operating temperature and humidity range		-20°C to 40°C (-4°F to 104°F), less than 80% RH (no condensation) 40°C to 45°C (104°F to 113°F), less than 60% RH (no condensation) 45°C to 50°C (113°F to 122°F), less than 50% RH (no condensation)
Storage temperature and humidity range		-25°C to 65°C (-13°F to 149°F), less than 80% RH (no condensation)
Dustproof/waterproof		IP40 (with protector attached, excluding terminals) IP65 (CARRYING CASE C0212)
Standards	Safety	EN IEC 61010-2-034: 2021, EN IEC 61010-2-033: 2021
	EMC	EN 61326
	Insulation resistance tester	IEC 61557-1, IEC 61557-2
Power supply		• LR6 (AA) alkaline battery × 8 • HR6 (AA) nickel-metal hydride (NiMH) rechargeable battery × 8 Max. power consumption: 12 VA
Continuous operating time (reference value at 23°C)		Approx. 5 hours without Z3210 installed; approx. 4 hours with Z3210 installed and using wireless communication Conditions: when using alkaline batteries, 5 kV generated, +/- terminals open, backlight off and comparator off
Dimensions and weight		195 mm (7.68 in.) W × 254 mm (10 in.) H × 89 mm (3.50 in.) D, 1.7 kg (59.97 oz.) (including batteries)

Basic Specifications (input, output, measurement)

Measurement items	Insulation resistance, PV insulation resistance[1], leakage current, voltage, capacitance (DD function)
Max. rated voltage to terminals	1,000 V AC, 2,000 V DC
Max. rated voltage to ground	1,000 V (CAT IV), 600 V (CAT III)

1. IR5051 only

Insulation resistance measurement

Test voltage	Constant voltage applied by the instrument to measure insulation resistance	
Range of test voltage	250 V to 5.20 kV DC	
User-set test voltage	250 V to 1 kV: in 10 V increments; 1 kV to 5 kV: in 25 V increments	
Open-circuit voltage	From 0% to 10% of test voltage	
Rated current	1 mA to 1.2 mA	
Short-circuit current	2 mA or less	
Effect of capacitive components	Within ±10% error of measurement value when the DUT has a capacitance of 5 µF or less	
Possible number of measurements	200 times or more on one set of fully-charged batteries	
Overload protection	1,100 V AC (10 sec., between +/- terminals) 6,000 V DC (10 sec., between +/- terminals)	
Induced noise removal	3 mA max.	
Test voltage (preset)	Guaranteed accuracy range	Accuracy
250 V	0.00 MΩ to 2.50 GΩ	±5% rdg. ±5 dgt.
	2.51 GΩ to 500 GΩ	±20% rdg.
500 V	0.00 MΩ to 5.00 GΩ	±5% rdg. ±5 dgt.
	5.01 GΩ to 1.00 TΩ	±20% rdg.
1,000 V	0.00 MΩ to 10.0 GΩ	±5% rdg. ±5 dgt.
	10.1 GΩ to 2.00 TΩ	±20% rdg.
2,500 V	0.00 MΩ to 25.0 GΩ	±5% rdg. ±5 dgt.
	25.1 GΩ to 5.00 TΩ	±20% rdg.
5,000 V	0.00 MΩ to 50.0 GΩ	±5% rdg. ±5 dgt.
	50.1 GΩ to 10.00 TΩ	±20% rdg.
Measurement range (auto)	Display range	Resolution
10 MΩ	0.00 MΩ to 9.99 MΩ	0.01 MΩ
100 MΩ	9.0 MΩ to 99.9 MΩ	0.1 MΩ
1000 MΩ	90 MΩ to 999 MΩ	1 MΩ
10 GΩ	0.90 GΩ to 9.99 GΩ	0.01 GΩ
100 GΩ	9.0 GΩ to 99.9 GΩ	0.1 GΩ
1000 GΩ	90 GΩ to 999 GΩ	1 GΩ
10 TΩ	0.90 TΩ to 9.99 TΩ	0.01 TΩ
	9.0 TΩ to 10.0 TΩ	0.1 TΩ

Leakage current measurement

Accuracy	±3% rdg. ±3 dgt. (guaranteed accuracy range: 1.00 nA to 3.00 mA)	
Measurement range (auto)	Display range	Resolution
10 nA	0.00 nA to 9.99 nA	0.01 nA
100 nA	9.0 nA to 99.9 nA	0.1 nA
1000 nA	90 nA to 999 nA	1 nA
10 µA	0.90 µA to 9.99 µA	0.01 µA
100 µA	9.0 µA to 99.9 µA	0.1 µA
1 mA	90 µA to 999 µA	1 µA
	0.90 mA to 3.00 mA	0.01 mA

Voltage measurement

Guaranteed accuracy range	30 V to 1,000 V AC (45 Hz to 65 Hz), ±10 V to ±2,000 V DC
Accuracy	±3% rdg. ±3 dgt.
Input resistance	500 kΩ or more (DC, 45 Hz to 65 Hz)
Overload protection	1,100 V AC (1 min., between +/- terminals) 2,200 V DC (1 min., between +/- terminals)

Capacitance measurement

Capacitance is automatically measured after insulation resistance measurement is over (not measured if output voltage is 250 V or less).

Accuracy	±10% rdg. ±5 nF (guaranteed accuracy range: 10.0 nF to 25.0 µF)	
Measurement range	Display range	Resolution
100 nF	0.0 nF to 99.9 nF	0.1 nF
1000 nF	100 nF to 999 nF	1 nF
10 µF	1.00 µF to 9.99 µF	0.01 µF
	10.0 µF to 25.0 µF	0.1 µF

PV insulation resistance (IR5051 only)

Test voltage	Constant voltage applied by the instrument to measure insulation resistance	
Range of test voltage	DC 250 V to 2.00 kV	
Test voltage presets	500 V, 1 kV, 1.5 kV	
User-set test voltage	250 V to 1 kV: in 10 V increments; 1 kV to 2 kV: in 25 V increments	
Open-circuit voltage	From 0% to 10% of test voltage	
Rated current	[Test voltage] / [20 MΩ]	
Short-circuit current	2 mA or less	
Effect of capacitive components	Within ±10% error of measurement value when the DUT has a capacitance of 5 µF or less	
Possible number of measurements	1,000 times or more on one set of fully-charged batteries	
Overload protection	1,100 V AC (10 sec., between +/- terminals) 6,000 V DC (10 sec., between +/- terminals)	
Test voltage (preset)	Guaranteed accuracy range	Accuracy
500 V	0.00 MΩ to 5.00 GΩ	±5% rdg. ±5 dgt.
	5.01 GΩ to 100 GΩ	±20% rdg.
1,000 V	0.00 MΩ to 10.00 GΩ	±5% rdg. ±5 dgt.
	10.1 GΩ to 100 GΩ	±20% rdg.
1,500 V	0.00 MΩ to 20.0 GΩ	±5% rdg. ±5 dgt.
	20.1 GΩ to 100 GΩ	±20% rdg.

Functions

Insulation diagnosis	PI, DAR, DD, SV, Ramp, Timer[2]
Others	Battery charge indicator, live circuit indicator, automatic power save, automatic discharge, backlight, buzzer, manual recording, logging recording, temperature and humidity input, elapsed time display, clock, filter, hardware filter, data-hold, system reset, USB communication (only when DT4900-01 is installed), wireless communication (only when Z3210 is installed), comparator, resistance gauge display, switching of insulation diagnosis function, breakdown cut-off, negative voltage notification (IR5051 only)

2. Only for the PV insulation resistance function

Included accessories

TEST LEAD L9850-01	Red, 3 m (9.84 ft.)
TEST LEAD L9850-02	Black, 3 m (9.84 ft.), shielded cable
TEST LEAD L9850-03	Blue, 3 m (9.84 ft.)
ALLIGATOR CLIP L9851-01	Red, for L9850
ALLIGATOR CLIP L9851-02	Black, for L9850
ALLIGATOR CLIP L9851-03	Blue, for L9850
CARRYING CASE C0212	
LR6 (AA) alkaline battery	× 8
Instruction manual	
Operating precautions	
TEST PIN SET L9852	Red and black, for L9850 (IR5051 and IR5051-90 only)
WIRELESS ADAPTER Z3210	(IR5051-90 only)

IR5050 with included accessories

Sold separately

TEST LEAD L9850-01 (red), -02 (black), -03 (blue), each 3 m (9.84 ft.)
TEST LEAD L9850-11 (red), -12 (black), -13 (blue), each 10 m (32.81 ft.)
ALLIGATOR CLIP L9851-01 (red), -02 (black), -03 (blue)
TEST PIN SET L9852 (red and black)
CARRYING CASE C0212
WIRELESS ADAPTER Z3210
COMMUNICATION PACKAGE (USB) DT4900-01


Test leads with alligator clips attached



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