HIOKI

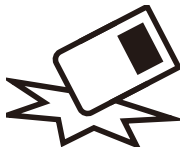
INSULATION TESTER Series



INSULATION TESTERS

Digital

DROP PROOF



Built tough to withstand
a 1-meter
drop onto a concrete floor



5 ranges

Rated output voltage (DC)
Effective maximum indicated value

- 50 V / 100 MΩ
- 125 V / 250 MΩ
- 250 V / 500 MΩ
- 500 V / 2000 MΩ
- 1000 V / 4000 MΩ

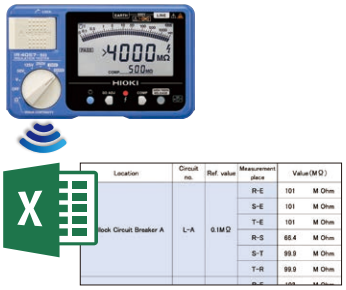
Manage measurement data using Bluetooth® communication



WIRELESS ADAPTER
Z3210 (Option)
Attach to enable Bluetooth® wireless technology

Learn More

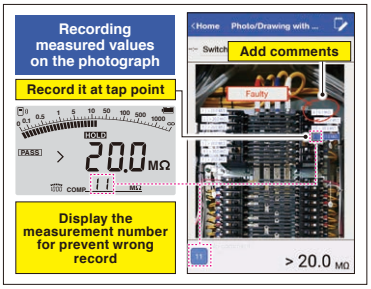
Transport to the Excel® file



Open an Excel® file and select a cell. The measured value being held on the instrument's display will be transferred to the computer and entered into the selected cell.

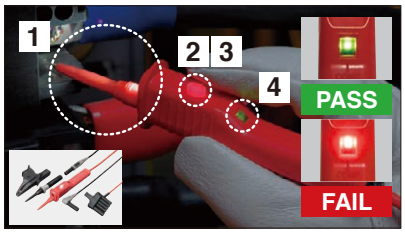
Transport to GENNECT Cross





GENNECT Cross, a free app designed specifically for use with Hioki measuring instruments, lets you check and manage measurement results and create reports. The software provides a range of functionality that helps manage data in the field, including photographing measurement sites, placing measurement results on photographs, and saving handwritten memos.

Significantly improve testing speed using test lead with remote switch



1. LED light shines a spotlight on the target
2. Red light warns of live voltage detection
3. Measurement start switch
4. Identify pass/fail decisions with red or green light

TEST LEAD SET WITH REMOTE SWITCH L9788-11 (Option)
*Standard with the IR4056-21, Not CE Marked

Identify PASS / FAIL using light and sound



Compare measured values to pre-set reference values to generate a pass or fail decision with the Comparator function.

Convenient for inspections

Low resistance measurement[1]

Perform EV and HEV continuity checks as well as resistance measurement of protective conductors in facility electrical equipment as defined by IEC 60364.

AC/DC voltage measurement

Automatically detect AC or DC for testing. Use as a tester thanks to DC voltage measurement functionality.

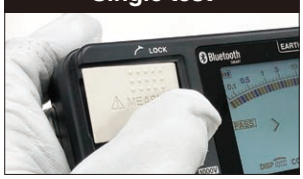
PV Ω dedicated function[2]

Measurement is not affected even when the PV system is online.

1. Excludes IR4053 2. IR4053 Only

One-touch Start and Stop

Single test



Measurement voltage is applied while MEASURE key is pressed

Continuous test



Lift and lock the MEASURE key to apply a continuous stream of voltage

Prevent Accidental High Voltage Generation

Flashing light



Release lock



Under [500V], [1000V], or [PVΩ] settings, the RELEASE button will blink. Press to unlock the release of high voltages as an extra safety meaure.

Lineup - Digital

CE

Product warranty for 3 years
Accuracy guaranteed for 1 year

Measurement type	Low voltage (less than 1000 V)				High voltage (less than 5000 V)	
	Standard	High-speed		PV		Standard
Model	**IR4056-20 IR4056-21**	**IR4057-50**	**IR4059**	**IR4053-10**	**IR5051**	**IR5050**
Appearance						
Number of ranges	5				5	
Testing voltage (DC) / Effective maximum indicated value	50 V /100 MΩ 125 V /250 MΩ 250 V /500 MΩ 500 V /2000 MΩ 1000 V /4000 MΩ				250 V /500 GΩ 500 V /1.00 TΩ 1000 V /2.00 TΩ 2500 V /5.00 TΩ 5000 V /10.00 TΩ	
PV Ω measurement	N/A			500 V / 2000 MΩ 1000 V / 4000 MΩ	500 V /100 GΩ 1000 V /100 GΩ 1500 V /100 GΩ	N/A
Leakage current measurement	N/A				0.00 nA to 3.00 mA	
DC voltage measurement	600 V			1000 V	2000 V	
AC voltage measurement	600 V				1000 V	
Low resistance measurement	✔			N/A	N/A	
Displaying 1-min. values	N/A	✔		N/A	✔	
Comparator decision response time	✔ 0.8 second	✔ 0.3 second		✔ 0.8 second (PV : 4 second)	✔	
AUTO power save	✔				✔	
Bluetooth® communication	N/A	✔ (With Z3210)		N/A	✔ (With Z3210)	
Resistance gauge	N/A	✔		N/A	✔	
Backlight	✔				✔	
Safety standard category	CAT III 600 V				CAT IV 1000 V CAT III 2000 V	
CE	✔[1]				✔	
Dustproof and waterproof	IP40[2]				IP40[2, 3], IP65[4]	
Drop proof	✔				N/A	
Power supply	LR03 (AAA) alkaline battery × 4 HR6 (AA) NiMH rechargeable battery x4				LR6 (AA) alkaline battery × 8 HR6 (AA) NiMH rechargeable battery x8	
Dimensions (W × H × D)	159 × 177 × 53 mm 6.26 × 6.97 × 2.09 in.		160 × 98 × 46 mm 6.30 × 3.86 × 1.81 in.	159 × 177 × 53 mm 6.26 × 6.97 × 2.09 in.	195 × 254 × 89 mm 7.68 × 10 × 3.50 in.	
Weight	600 g (21.2 oz)	640 g (22.6 oz)	536 g (18.9 oz)	600 g (21.2 oz)	1.7 kg (59.97 oz)	

1 : IR4056-21 excluded 2 : Terminal not included 3 : With protector attached 4 : CARRYING CASE C0212

INSULATION TESTER IR4056-20, IR4056-21

CE * IR4056-20 only
Product warranty for 3 years
Accuracy guaranteed for 1 year





With
• TEST LEAD L9787
• Neck strap
• LR6 alkaline battery ×4
• Instruction manual

IR4056-20





With
• TEST LEAD SET WITH REMOTE SWITCH L9788-11
• Neck strap
• LR6 alkaline battery ×4
• Instruction manual

IR4056-21 **Not CE marked**

CAT S | DISPLAY HOLD | AUTO OFF

Comparator decision response time : 0.8 s

5 ranges

CAT III 600 V

INSULATION TESTER IR4057-50, IR4059

CE c SP US * IR4057-50 only
Product warranty for 3 years
Accuracy guaranteed for 1 year



IR4057-50



IR4059



L4930



L4938





WIRELESS ADAPTER Z3210 (Option)
Attach to enable Bluetooth® wireless technology

With Z3210

Bluetooth®
Please see www.hioki.com for list of supported regions.

GENNECT Cross

CAT S | DISPLAY HOLD | AUTO OFF

Comparator decision response time : 0.3 s

Digital bar graph

5 ranges

CAT III 600 V

Included accessories
• CONNECTION CABLE L4930
• ALLIGATOR CLIP SET L4935
• TEST PIN SET L4938
• TEST LEAD SET WITH REMOTE SWITCH (RED) L9788-10 (IR4059 only)
• PROTECTOR Z5042 (IR4059 only)
• Neck strap
• LR6 alkaline battery ×4
• Instruction manual

INSULATION TESTER (For Photovoltaic Generation Systems) IR4053-10

CE
Product warranty for 3 years
Accuracy guaranteed for 1 year





With
• TEST LEAD L9787
• Neck strap
• LR6 alkaline battery ×4
• Instruction manual

IR4053-10

CAT S | DISPLAY HOLD | AUTO OFF

Comparator decision response time : 0.8 s

Comparator decision response time (PV) : 4 s

5 ranges

CAT III 600 V

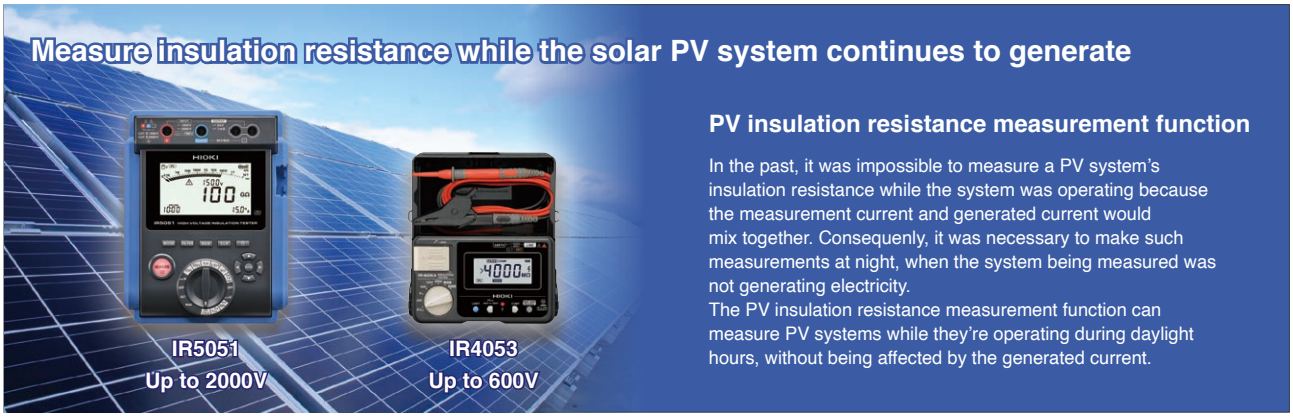
Model	IR4056-20	IR4056-21	IR4057-50	IR4059	IR4053						Basic accuracy
Measurement parameters: Insulation resistance	✔				✔	Testing voltage (DC)	50 V	125 V	250 V	500 V	1000 V	-
						Effective maximum indicated value (MΩ)	100	250	500	2000	4000	-
						1st effective measuring range (MΩ)	0.200 to 10.00	0.200 to 25.0	0.200 to 50.0	0.200 to 500	0.200 to 1000	±2% rdg. ±2 dgt.
						2nd effective measuring range (MΩ)	10.1 to 100.0	25.1 to 250	50.1 to 500	501 to 2000	1010 to 4000	±5% rdg.
PV Ω measurement	N/A				✔	Testing voltage (DC)	500 V		1000 V			-
						Effective maximum indicated value (MΩ)	2000		4000			-
						1st effective measuring range (MΩ)	0.200 to 500		0.200 to 1000			±4% rdg.
						2nd effective measuring range (MΩ)	501 to 2000		1010 to 4000			±8% rdg.
DC Voltage	N/A				✔	4.200 V/42.00 V/420.0 V/1000 V						±1.3% rdg. ±4 dgt.[1]
		✔			N/A	4.200 V/42.00 V/420.0 V/600 V						±1.3% rdg. ±4 dgt.[1]
AC Voltage		✔			✔	420.0 V[2]/600 V						±2.3% rdg. ±8 dgt.[1]
Low resistance measurement		✔			N/A	10.00 Ω/100.0 Ω/1000 Ω						±3% rdg. ±2 dgt.

Other	
Operating temperature	IR4056-20, IR4056-20, IR4057-50, IR4059: -25°C to 65°C, 90% RH or less (non-condensating) IR4053: 0°C to 50°C, 90% RH or less (non-condensating)
Storage temperature	IR4056-20, IR4056-20, IR4057-50, IR4059: -25°C to 65°C, 90% RH or less (non-condensating) IR4053: -10 °C to 50°C, 90% RH or less (non-condensating)
Dustproof and waterproof	IP40 (Terminal excluded)
Standards	EN61326 (EMC), EN61557-1/-2/-4[3]/-10
Power supply Continuous operating time	LR6 alkaline battery ×4 20 hours
Dimensions (W × H × D)	IR4056-20, IR4056-21, IR4057-50, IR4053-10: 159 × 177 × 53 mm (6.26 × 6.97 × 2.09 inch)
	IR4059: 160 x 98 x 46 mm (6.30 x 3.86 x 1.81 inch)
Weight	IR4056-20, IR4056-21. IR4053: 600 g (21.2 oz) IR4059: 536 (18.9 oz) IR4057-50: 640 g (22.6 oz)

1. Ranges in excess of 600 V/1000 V are outside the accuracy guarantee
2. Minimum indicated value: 30.0 V
3. Subclause 4.3 of Part 4 (interchanging of test leads) is not applicable when L9788-10 is used

Order code	IR4056-20
Order code	IR4056-21
Order code	IR4057-50
Order code	IR4057-90
Order code	IR4059
Order code	IR4053-10
Order code	Z3210

Model IR4057-90 includes Z3210 as a set



HIGH VOLTAGE INSULATION TESTER IR5050, IR5051

Product warranty for 3 years
Accuracy guaranteed for 1 year



IR5050



IR5051
IR5051-90
(Include Z3210 as a set)

Standard | **For PV systems**

5 ranges

CAT IV 1000 V, CAT III 2000 V

Order code **IR5050**

Order code **IR5051**

Order code **IR5051-90**

Included accessories



L9850, L9851

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

1. With protector attached, excluding terminals

Measurement parameters	Insulation resistance	Testing voltage (DC) : measuring range	250 V: 0.00 MΩ to 500 GΩ 500 V: 0.00 MΩ to 1.00 TΩ 1000 V: 0.00 MΩ to 2.00 TΩ 2500 V: 0.00 MΩ to 5.00 TΩ 5000 V: 0.00 MΩ to 10.00 TΩ
		Rated current	1 mA to 1.2 mA
		Short-circuit current	2 mA or less
		Accuracy	±5% rdg. ±5 dgt., ±20% rdg.
		Induced noise removal	3 mA max.
	Leakage current		10 nA/ 100 nA/ 1000 nA/ 10 µA/ 100 µA/ 1 mA Guaranteed accuracy range: 1.00 nA to 3.00 mA Accuracy: ±3% rdg. ±3 dgt.
	DC voltage		±10 V to ±2000 V Accuracy: ±3% rdg. ±3 dgt.
	AC voltage		30 V to 1000 V Accuracy: ±3% rdg. ±3 dgt.
	Capacitance		100 nF/ 1000 nF/ 10 µF Guaranteed accuracy range: 10.0 nF to 25.0 µF Accuracy: ±10% rdg. ± 5 nF
	PV insulation resistance (IR5051 only)	500 V	0.00 MΩ to 100 GΩ
		1000 V	0.00 MΩ to 100 GΩ
		1500 V	0.00 MΩ to 100 GΩ
Other	Operating temperature and humidity range		-20°C to 40°C, less than 80% RH (no condensation) 40°C to 45°C, less than 60% RH (no condensation) 45°C to 50°C, less than 50% RH (no condensation)
	Storage temperature and humidity range		-25°C to 65°C, less than 80% RH (no condensation)
	Dustproof/waterproof		IP40[1], IP65 (CARRYING CASE C0212)
	Standards		EN IEC61010 (safety), EN61326 (EMC), IEC61557-1, -2 (insulation resistence tester)
	Power supply Continuous operating time		• LR6 (AA) alkaline battery ×8: • Approx. 5 hours without Z3210 installed • Approx. 4 hours with Z3210 installed and using wireless communication • HR6 (AA) nickel-metal hydride (NiMH) rechargeable battery ×8
	Dimensions (W × H × D)		195mm (7.68 in.) × 254 mm (10 in.) × 89 mm (3.50 in.)
	Weight		1.7 kg (59.97 oz.)

01 Settings

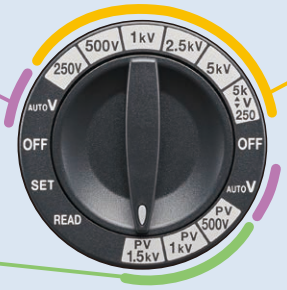
Choose the output voltage ▶ Rotary knob

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

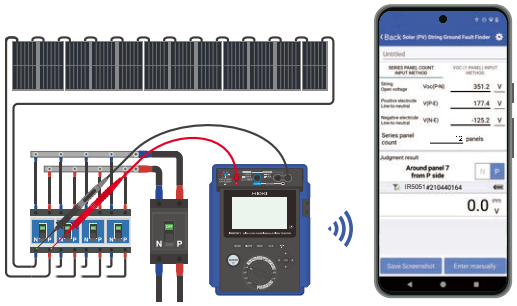
The output voltage can also be set in 10 V or 25 V increments. An output voltage of up to 2 kV can be set for PV insulation resistance measurement using this function. (PV insulation resistance measurement is only available on the IR5051.)

Identify panels with ground faults in 2000 V solar power systems

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

01 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.

02 Create reports in the field

GENNECT Cross

Please see the GENNECT Cross website for more information.



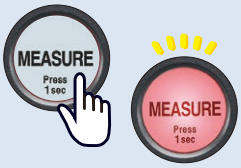
GENNECT Cross can be used to create reports in the field. You can photograph a junction box and then place measured values on the image. In this way, you can create images that visually tie together the measurement values to their locations.

02 Measurement

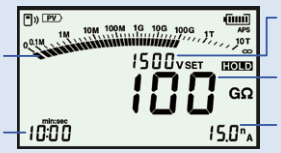
Start test ▶ Automatic discharge begins right after measurement

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.

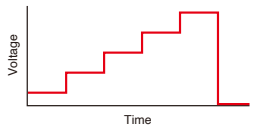


Screen during testing



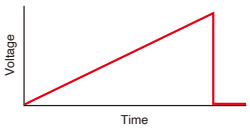
Insulation diagnostics function

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.



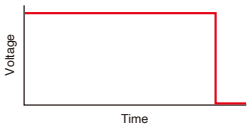
Step voltage (SV)

Increase test voltage across 5 stages.



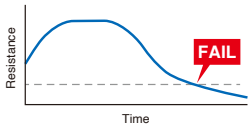
Ramp voltage (ramp)

Increase the test voltage continuously.



Timer

Stop testing automatically after the set time has elapsed.



Comparator

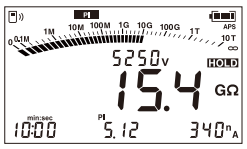
Generate pass/fail judgments using a threshold for insulation resistance values.

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.

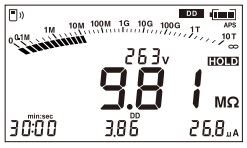


$$PI \text{ or } DAR = \frac{t_2 \text{ resistance value}}{t_1 \text{ resistance value}}$$

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.



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

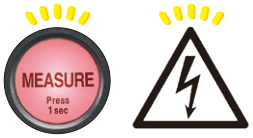
Capacitance

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

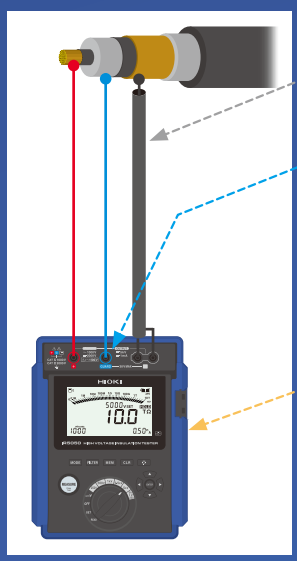
Auto-discharge

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).



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

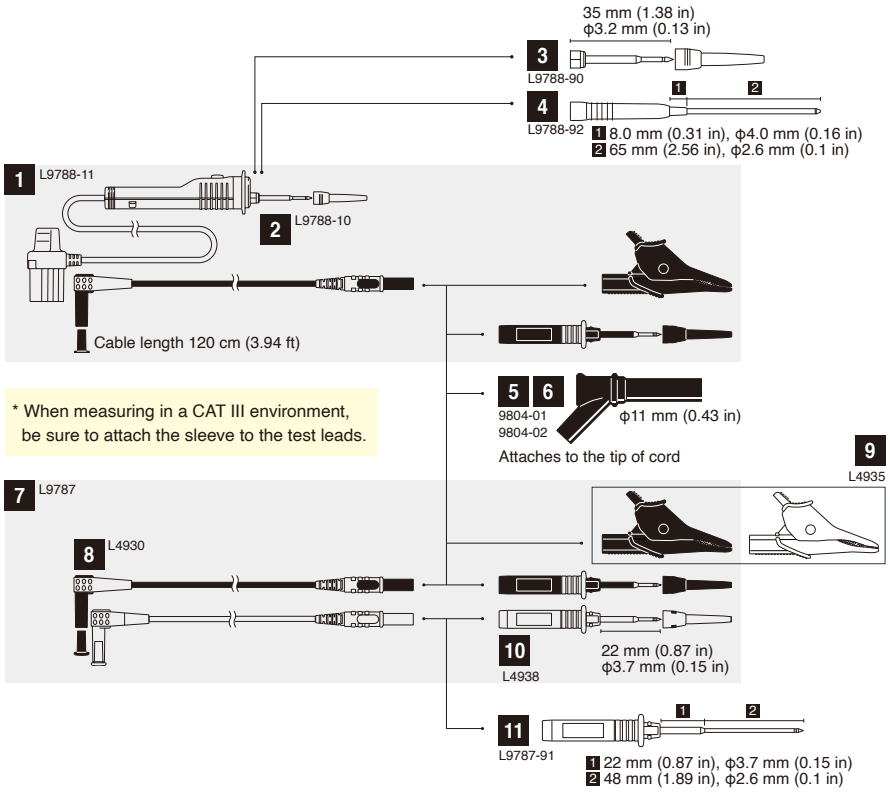
You can power the instrument with either AA alkaline batteries or store-bought nickel-metal hydride (NiMH) batteries. In this way, the design is both environmentally friendly and economical. Each battery change is good for at least 200 measurements (or at least 1000 measurements if using PV insulation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



Options

IIR4016-20, IR4017-20, IR4018-20, IR4056-20, IR4056-21, IR4057-50, IR4057-90, IR4053-10, IR4059, 3490	
1	TEST LEAD SET WITH REMOTE SWITCH L9788-11
2	TEST LEAD WITH REMOTE SWITCH (RED) L9788-10
3	TIP PIN L9788-90
4	BREAKER PIN L9788-92
5	MAGNETIC ADAPTER 9804-01
6	MAGNETIC ADAPTER 9804-02
7	TEST LEAD L9787
8	CONNECTION CABLE SET L4930
9	ALLIGATOR CLIP SET L4935
10	TEST PIN SET L4938
11	BREAKER PIN L9787-91
12	WIRELESS ADAPTER Z3210 (For IR4057-50, IR4059)
13	PROTECTOR Z5042 (For IR4059)
14	CARRYING CASE C0213 (EV MAINTENANCE MANUAL INCLUDED)
15	FUSE SET Z5052 (0.5 A/ 1000 V Fuse set of 2)





IR5050, IR5051		
1	TEST LEAD L9850 -01	Red, 3 m (9.84 ft.)
2	TEST LEAD L9850 -02	Black, 3 m (9.84 ft.)
3	TEST LEAD L9850 -03	Blue, 3 m (9.84 ft.)
4	TEST LEAD L9850 -11	Red, 10 m (32.81 ft.)
5	TEST LEAD L9850 -12	Black, 10 m (32.81 ft.)
6	TEST LEAD L9850 -13	Blue, 10 m (32.81 ft.)
7	ALLIGATOR CLIP L9851 -01	Red
8	ALLIGATOR CLIP L9851 -02	Black
9	ALLIGATOR CLIP L9851 -03	Blue
10	TEST PIN SET L9852	Red and black
11	CARRYING CASE C0212	
12	WIRELESS ADAPTER Z3210	
13	COMMUNICATION PACKAGE DT4900-01 USB	



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