

FOOTWEAR TESTER

FG-465

Instruction Manual

Thank you for your purchase of the HAKKO FG-465 Footwear Tester.

This product is for testing anti-static footwear.

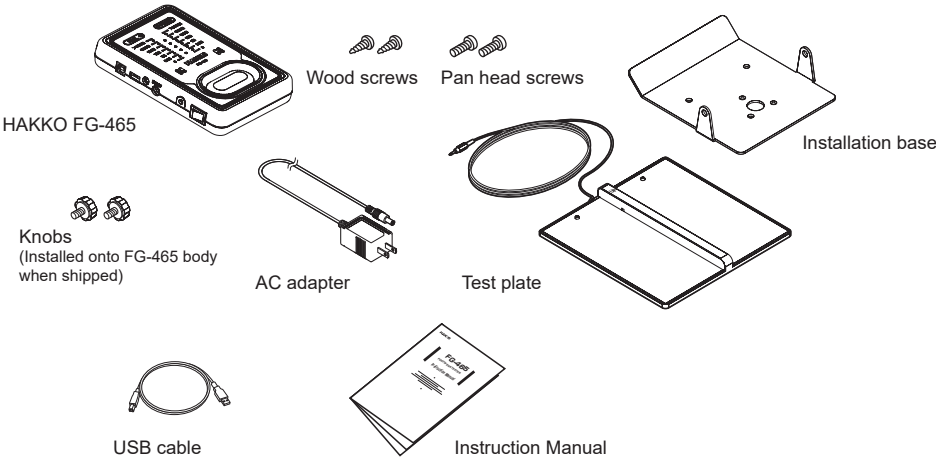
Before using this product, be sure to read this manual.

Keep this manual readily accessible for reference.

1. Contents

Please check to make sure that all items listed below are included in the package.

HAKKO FG-465.....	1	USB cable.....	1
Installation base.....	1	Pan head screws (M5 x 10).....	2
AC adapter	1	Wood screws (DN 4.5 x 16).....	2
Test plate	1	Instruction Manual (this document)	1
Knobs	2		



2. Specifications

● HAKKO FG-465

Rating		DC 24 V 50 mA
Measurement voltage		DC 20 V
Measurement Range	Upper limit	1000 MΩ (1 × 10 ⁹ Ω)
		100 MΩ (1 × 10 ⁸ Ω)
		10 MΩ (1 × 10 ⁷ Ω)
	Lower limit	1 MΩ (1 × 10 ⁶ Ω)
		0.1 MΩ (1 × 10 ⁵ Ω)
Conductivity evaluation	R < 0.1 MΩ (1 × 10 ⁵ Ω)	
Accuracy	R < 0.1 MΩ	±5%
	0.1 MΩ ≤ R ≤ 100 MΩ	±10%
	100 MΩ < R	±8%
Operating environment		Ambient Temperature/Humidity Range: 0 to 40°C (32 to 104°F), max.80% RH (without condensation)
Environmental conditions		Applicable rated pollution degree 2 (according to IEC/UL61010-1)
Dimensions		120 (W) × 30 (H) × 185 (D) mm (4.7 × 1.2 × 7.3 in)
Weight		0.55 kg (1.2 lb) (including installation base)

● Test plate

Cord length	1.6 m (5.2 ft)
Dimensions (w/o cord)	300 (W) × 30 (H) × 300 (D) mm (11.8 × 1.2 × 11.8 in)
Weight (w/o cord)	1.9 kg (4.2 lb)

● AC adapter

Output voltage	DC 24 V
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* For details on calibrating the FG-465, contact your nearest agent.

* Please note that specifications and appearance are subject to change without notice in the interest of product improvement.

※ 各言語（日本語、英語、中国語、フランス語、ドイツ語、韓国語）の取扱説明書は以下のURL、HAKKO Document Portalからダウンロードしてご覧いただけます。

（商品によっては設定の無い言語がありますが、ご了承ください。）

* 各国語言（日語、英語、中文、法語、德語、韓語）的使用說明書可以通過以下網站的HAKKO Document Portal 下載參閱。

（有一部分的產品沒有設定外語對應、請見諒）

* Instruction manual in the language of Japanese, English, Chinese, French, German, and Korean can be downloaded from the HAKKO Document Portal.

(Please note that some languages may not be available depending on the product.)



<https://doc.hakko.com>

3. Safety and Handling Precautions

This document divides precautions into the following two categories, "WARNING" and "CAUTION."

Fully understand the content of the precautions below before reading descriptions in this document.

⚠ WARNING : This indicates that mishandling might lead to death or serious injury.

⚠ CAUTION : This indicates that mishandling might lead to injury or damage to property.

Note : This indicates procedures or information that are important in a process described in this document.

Be sure to observe the following precautions to ensure safety.

⚠ WARNING

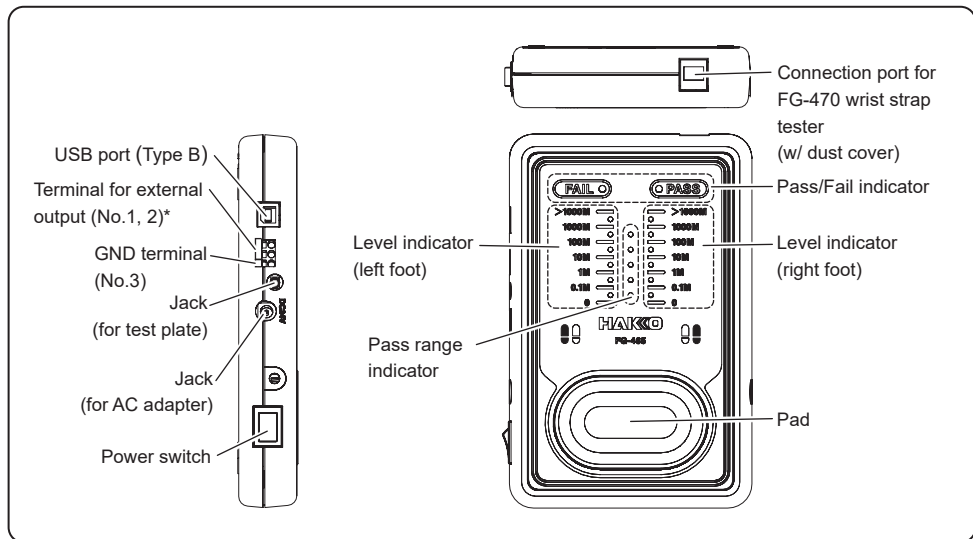
- Those without the permission of a manager and those without the required experience or knowledge (including children) are not allowed to use this product.
- Do not allow children to play with this product.
- Do not allow children to clean or perform user maintenance without supervision.

Failure to observe the following precautions to ensure safety might result in electric shock, malfunction or other trouble.

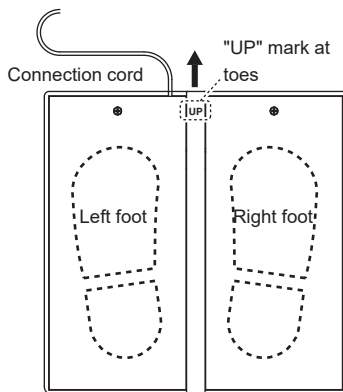
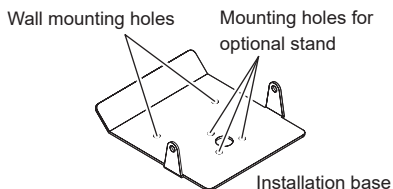
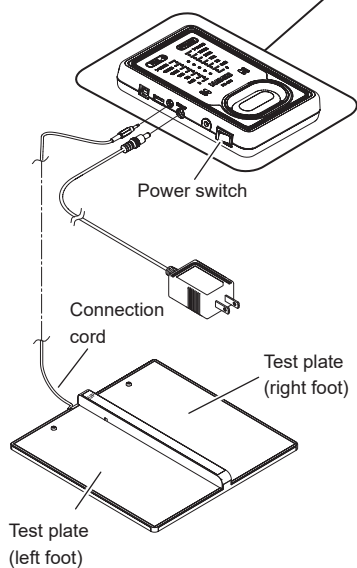
⚠ CAUTION

- Before using this product, fully read all descriptions in this document.
- During measurement with this product, a trace amount of current flows to the human body. People with a weak heart or those using a cardiac pacemaker should not use this product.
- Users that are pregnant, please consult with the proper medical specialist.
Current flowing through human body: 2 to 3 μA approx. (reference value (measurement on the antistatic shoes: 20 M Ω))
Current flowing through human body: 50 to 100 μA (measurement on bare feet)
- Wearing thick socks with anti-static footwear may adversely affect the measurement result. In addition, when performing measurement, correctly wear anti-static footwear in accordance with the designated instructions.
- The installation base is also used with the optional exclusive stand. Be sure to store this base in a safe place.
- Do not subject this product to strong impact. Do not tap or push on the pad with strong force.
- This product is for indoor use only. Do not use it outdoors.
- When discontinuing or stopping use of this product or when moving away from where this product is mounted, turn it OFF.
- When this product is not used for a long time, or before repairing or cleaning this product, disconnect the AC adapter plug from the power outlet.
- When replacing parts, use only genuine HAKKO parts.
- Use only the AC adapter that is included in the set. Do not use other AC adapters.
- Do not modify this product.
- Do not use this product with damaged cords or plugs.
Also, if this product malfunctions, is dropped or is damaged in other ways, immediately stop use of this product.
- When inserting and removing the plug, hold the plug body and do not pull the cord.
- Do not allow this product to get wet. Also, do not handle it with wet hands.
- Do not perform any other actions that may be considered to be dangerous.

4. Names of Parts



* See "External output (P. 8)."



⚠ CAUTION

When installing the test plate, make sure that the part marked "UP" is positioned at the toes.

5. Installation

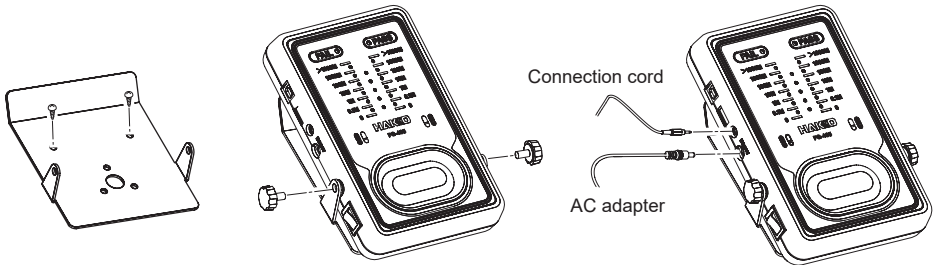
Note This product can also be mounted on a wall or optional stand in addition to use on a desktop.

When mounting on a wall

- (1) Mount the installation base on the wall using the wood screws or pan head screws (provided) as shown in the figure.
- (2) Place the body on the installation base, and fix it in place with the knobs.
- (3) Insert the connection cord from the test plate and AC adapter plug into the jacks on the left side of the body.
- (4) Insert the AC adapter into the power outlet.

⚠ CAUTION

- When mounting this product on a wall or similar surface, consider the wall thickness, strength and other factors. Prepare anchor bolts or screws if necessary. Ensure safety when mounting.
- When this product is not used for a long time, disconnect the plug.
Be sure to firmly insert the connection cord plug. Incomplete insertion may cause malfunction.



6. Operation

⚠ CAUTION

During measurement with this product, a trace amount of current flows to the human body. People with a weak heart or those using a cardiac pacemaker should not use this product.

Measurement

- (1) Turn the power switch ON. The preset pass range indicator LED lights.
- (2) Put on the anti-static footwear, and step onto the test plate making sure that the correct foot is on the correct side.
- (3) Gently press the pad with three fingers as shown in the figure below.



- (4) The left foot is measured first followed by the right foot.

Note Measurement of the left foot is started from the center of the preset pass range or from just above the center (when range LED indicates an even number).

Example: When pass range is $0.1 \text{ M}\Omega \leq R \leq 1000 \text{ M}\Omega$, measurement is started from the $10 \text{ M}\Omega \leq R \leq 100 \text{ M}\Omega$ range.

Note Measurement of the right foot starts from the range finalized by measurement of the left foot. If there is no problem with the footwear, the range movement becomes minimum. This results in a shorter measurement time.

- (5) The pass/fail result is displayed.

Note If you move your hand away from the pad before measurement is completed, the buzzer sounds three times.
Pass/Fail results will not be shown. Repeat the measurement.

- (6) After you have confirmed the pass/fail result, move your hand away from the pad, and step off the test plate.

Note If you move your feet on the test plate or contact between your fingers and the pad is poor, this may result in false measurement.
During measurement stay still on the test plate and firmly place three fingers on the pad.

* This product can be used without being grounded. However, we recommend grounding the GND terminal (for details on terminal position, see "4. Names of Parts") on the left side of the body.

When PASS LED lights

This indicates that the anti-static footwear is in a normal state.
The level indicator LED lights which indicates which range the resistance value of the footwear is in.
This also allows you to check the properties of the anti-static footwear.

When FAIL LED lights

This indicates that the anti-static footwear including the human body is outside the preset range. Check the cause and take action such as replacing the anti-static footwear.

Measurement value is lower than lower limit

Example: The soles of the footwear have worn down
Metal fragments are stuck in the soles of the footwear, etc.

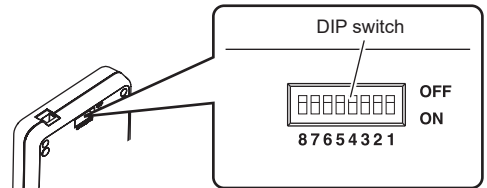
Measurement value is higher than upper limit

Example: You are wearing thick socks
The footwear itself is defective or the soles of the footwear are dirty, etc.

Setting by DIP switches

The upper and lower limits of the pass/fail levels, sounding of the buzzer, and other parameters can be set by switching the DIP switches on the rear of the body.

Note Default setting is all OFF.
(Pass range is $0.1 \text{ M}\Omega \leq R \leq 100 \text{ M}\Omega$)



⚠ CAUTION

Before changing the DIP switch settings, be sure to turn the power OFF.

DIP switch setting table

Setting		DIP switch No.								
		8	7	6	5	4	3	2	1	
Electrical Conductivity*	$R < 0.1 \text{ M}\Omega$								ON	ON
Lower limit	$R < 0.1 \text{ M}\Omega$								OFF	ON
	$0.1 \text{ M}\Omega (1 \times 10^5 \Omega)$								OFF	OFF
	$1 \text{ M}\Omega (1 \times 10^6 \Omega)$								ON	OFF
Upper limit	$10 \text{ M}\Omega (1 \times 10^7 \Omega)$					OFF	ON			
	$100 \text{ M}\Omega (1 \times 10^8 \Omega)$					OFF	OFF			
	$1000 \text{ M}\Omega (1 \times 10^9 \Omega)$					ON	OFF			
Buzzer	Buzzer ON when result is PASS				OFF					
	Buzzer ON when result is FAIL				ON					
External output	External output when result is PASS			OFF						
	External output when result is FAIL			ON						
Function disabled**						ON	ON			
			ON							
		ON								

* When both DIP switches 1 and 2 are set to ON, the upper limit cannot be set.

** When both DIP switches 3 and 4 are set to ON, or when switch 7 or 8 is set to ON, this cannot be used.

Different standard values for conductive footwear, general anti-static footwear and special anti-static footwear are stipulated in JIS T 8103.

The setting can be changed to the pass range suited to each footwear by changing the DIP switch settings.

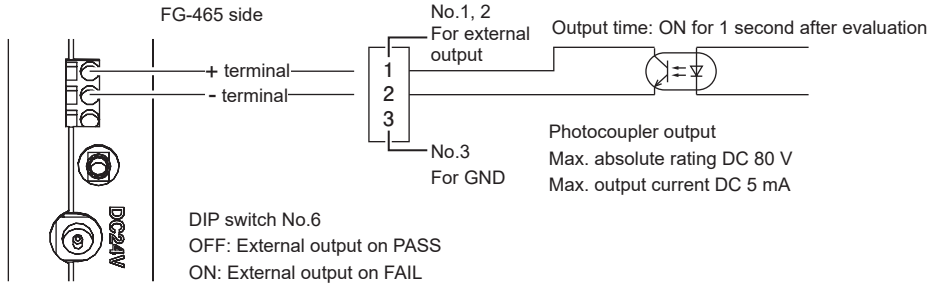
6. Operation (cont'd)

External output

The terminal block for external output is located on the left side of the body. Pass/Fail results can be output from this terminal.

The following shows the output circuit. Output can be enabled by either "PASS" or "FAIL" according to the DIP switch settings.

As external output is photocoupler output, add a drive circuit when a large current is required for connection of a relay or other device.



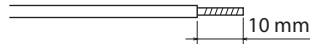
Terminal block for external output (conditions of use)

Model	XW4C-03E1-H1 (made by OMRON)		
Stripped length of lead	10 mm		
Applicable lead	Single wire	0.2 mm ² — 4.0 mm ²	
	Strand wire	0.2 mm ² — 2.5 mm ²	
	Rod terminal	w/o sleeve	0.25 mm ² — 2.5 mm ²
		w/ sleeve	0.25 mm ² — 1.5 mm ²
AWG	24 — 12		

Connection to terminal block

Example: When directly connecting lead

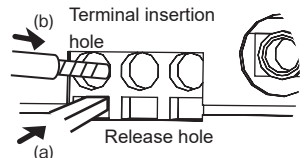
- (1) Use a lead of size that falls under the applicable lead category.
- (2) Strip back 10 mm of the sheath from the end of the lead, and twist the end.



⚠ CAUTION

A correct connection is no longer possible if the end of the lead is pre-soldered.

- (3) Push in a screwdriver or similar tool into the release hole on the terminal block. (a)
- (4) Insert the lead with sheath stripped back from its end into the terminal insertion hole. (b)
When removing the lead, push a screwdriver or similar tool into the release hole, and draw out the lead.



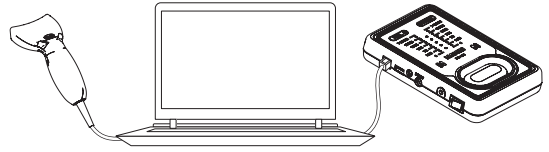
Connecting to a PC

FG-465 measurement data can be saved to a PC by connecting to a PC via the USB cable (provided).

The ID of the person performing measurement also can be entered by connecting an ID input device (USB (HID) type) to a PC.

Download the exclusive software from the following URL. The exclusive software is also supplied with an Instruction Manual.

<https://doc.hakko.com>



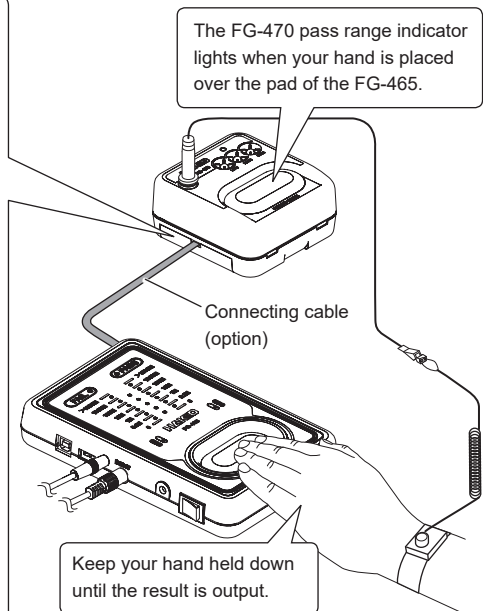
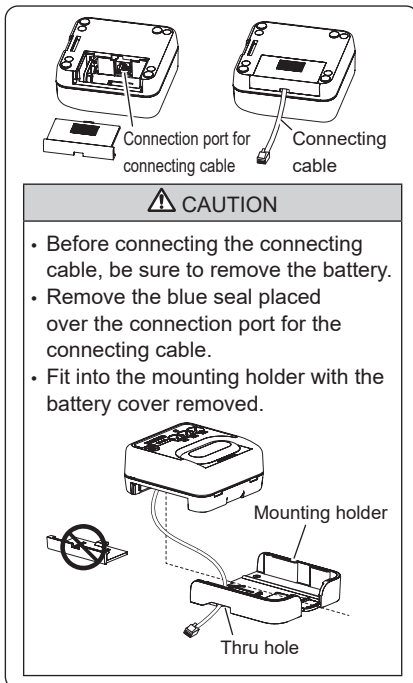
Interlocking operation of the wrist strap tester HAKKO FG-470

The anti-static footwear and wrist strap can be evaluated in a single measurement by connecting the FG-465 and FG-470 by the exclusive connecting cable (optional).

- Remove the dust cover at the top side of the FG-465. (See "4. Names of Parts.")
- After connecting the FG-470, turn the FG-465 ON.

When these are connected correctly, the buzzer sounds twice. When the power is turned ON on just the FG-465, the buzzer sounds once.

- During measurement, the LED on the FG-470 changes state. This is not an abnormality.
- Remove the battery for the FG-470 before use.
- There is no need to press the pad on the FG-470.
- Both the FG-465 and FG-470 can be attached to the "stand" (optional) by using the optional "unit integration base." (See "8. Parts List.")



7. Troubleshooting

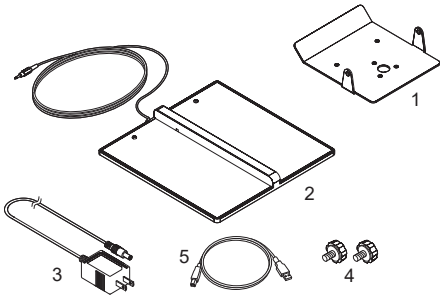
WARNING

Before replacing parts, be sure to disconnect the AC adapter plug from the power outlet.

No operation even if power switch is turned ON.	Is the AC adapter or connection cord disconnected?	▶ Connect.
The pass range indicator LED does not light.	Is the DIP switch setting wrong?	▶ Set ON or OFF while referring to the DIP switch setting table.
The buzzer just sounds 3 times and the pass/fail result is not output.	Did you move your hand away from the pad quickly?	▶ Do no move your hand away from the pad until "PASS" or "FAIL" is finalized.
The result of daily inspection is NG.	Is the connection cord plug firmly inserted?	▶ Firmly insert.
The "PASS" and "FAIL" LEDs blink.	Is the connecting cable firmly inserted?	▶ Firmly insert, and turn the power OFF then back ON again.

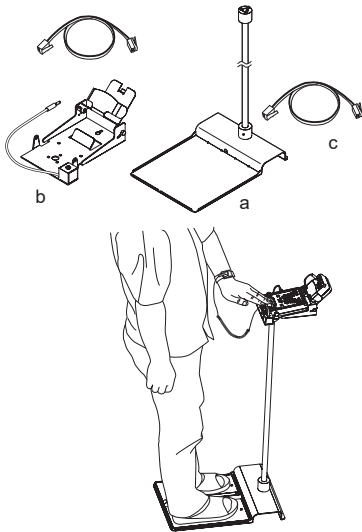
When other problems occur or performing the above remedies does not resolve a problem, contact your nearest agent.

8. Parts List



Parts for HAKKO FG-465

Dwg. No.	Part No.	Part Name	Specifications
1	B5116	Installation base	
2	B5117	Test plate	w/ connection cord
3	B5118	AC adapter	CH plug
	B5119	AC adapter	BS plug
	B5220	AC adapter	European plug CE
	B3528	AC adapter	2 Core & Flat pin plug
4	B1991	Knobs	qty 2
5	B5262	USB cable	1 m



Mounting example

Options

Dwg. No.	Part No.	Part Name	Specifications
a	C5032	Stand	w/ hexagon wrench, screws
b	B5263	Unit integration base	w/ connecting cable
c	B5264	Connecting cable	For interlocking FG-465 and FG-470



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