HAKKO

HAKKO FOOTWEAR TESTER FG-460

Footwear Tester

Instruction Manual

Thank you for purchasing the HAKKO FG-460 Footwear Tester.
The HAKKO FG-460 is a tester for determining the anti-static performance of safety shoes while worn by the operator.
The operator needs only to step onto the tester plate with one's shoes on and gently press the pad on the tester by hand.
The tester determines whether resistance is within the range specified in JIS T8103 and, if the pair of shoes is good, displays the range that resistance falls in.
Please read this manual before operating the HAKKO FG-460.
Keep this manual readily accesible for reference.

1. PACKING LIST

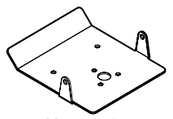
Please check to make sure that all items listed below are included in the package.

HAKKO FG-460 Footwear Tester	1	Pan head screw	2
Mounting base	1	Wood screw	2
AC adapter	1	Instruction Manual	1
Test plate	1		
Mounting screw*	2		

HAKKO FG-460 Footwear Tester (main unit)

Wood screw (x 2)

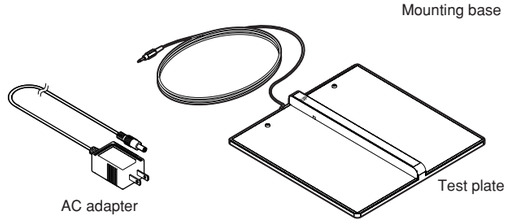
Pan head screw (x 2)



Mounting base

Mounting screw (x 2)*

* Delivered as they are screwed onto the tester main unit.



AC adapter

Test plate

※ 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）
* 各國語言(日語,英語,中文,法語,德語,韓語)的使用説明書可以通過以下网站的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 for the language, Japanese, English, Chinese, French, German and Korean can be downloaded from the following URL, HAKKO Document Portal.
(Please note that some language may not be available depending on the product.)

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中國RoHS: 產品中有毒有害物質或元素的名稱及含量

部件名稱	有毒有害物質或元素					
	鉛(Pb)	汞(Hg)	鎘(Cd)	六價鉻 (Cr(VI))	多溴聯苯 (PBB)	多溴二苯醚 (PBDE)
電路板	×	○	○	○	○	○
AC轉接器	×	○	○	○	○	○
插座	×	○	○	○	○	○

○： 表示該有毒有害物質在該部件所有均質材料中的含量均在SJ/T 11363-2006 標準規定的限量要求以下。
×： 表示該有毒有害物質至少在該部件的某一均質材料中的含量超出SJ/T 11363-2006 標準規定的限量要求。

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http://www.hakko.com

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2. SPECIFICATIONS

Rating		DC24V 33mA
Measurement Voltage		DC20V
Measurement Range (Ω)	Upper evaluation limit	1000 MΩ (1×10^9 Ω)
		100 MΩ (1×10^8 Ω)
		10 MΩ (1×10^7 Ω)
	Lower evaluation limit	1 MΩ (1×10^6 Ω)
		0.1 MΩ (1×10^5 Ω)
		R ＜ 0.1 MΩ (1×10^5 Ω)
	Conductivity evaluation	R ＜ 0.1 MΩ (1×10^5 Ω)
Evaluation level accuracy	R ＜ 0.1 MΩ	± 5%
	1 MΩ ≦ R ≦ 100 MΩ	± 10%
	100 MΩ ＜ R	± 8%
Operating environment		Ambient temperature/humidity range 0 - 40°C (32 - 104°F), 20 - 90%RH (without condensation)
Dimensions		120 (W) × 30 (H) × 185 (D) mm (4.7 × 1.2 × 7.3 in.)
Weight		0.55 kg (1.2 lb.) (Including mounting base)
Environmental condition		Applicable rated pollution degree 2 (According to IEC/UL61010-1)

● **Test plate**

Cord length	1.6 m
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	DC24V

*** HAKKO offers calibration service for the HAKKO FG-460. Contact HAKKO for details.**

* Specifications and design are subject to change without notice.

3. WARNINGS, CAUTIONS AND NOTES

Warnings, cautions and notes are placed at critical points in this manual to direct the operator's attention to significant items. They are defined as follows:

⚠ **WARNING:** Failure to comply with a WARNING may result in serious injury or death.

⚠ **CAUTION :** Failure to comply with a CAUTION may result in injury to the operator, or damage to the items involved.

NOTE : A NOTE indicates a procedure or point that is important to the process being described.

⚠ WARNING

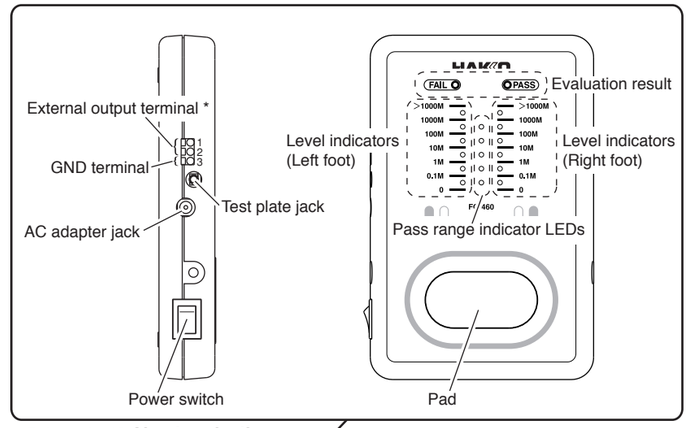
- This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in safe way and understand the hazards involved.
- Children shall not play with the appliance.
- Cleaning and user maintenance shall not be made by children without supervision.

To prevent electrical shock and damage, observe the following precautions.

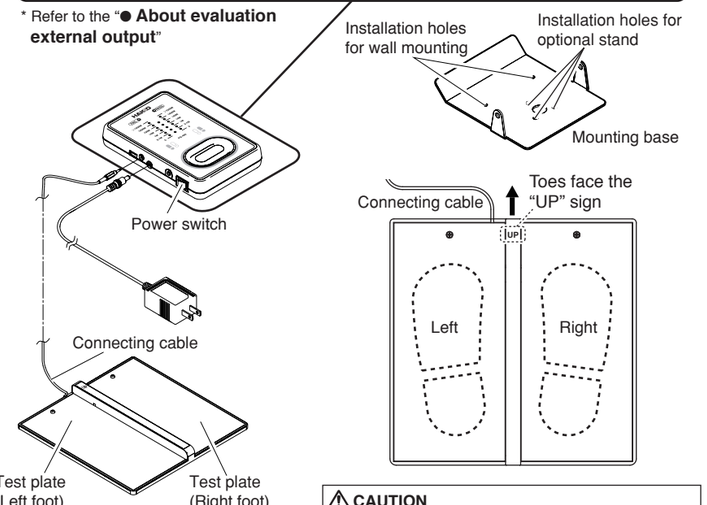
⚠ CAUTION

- Do not wet the product. And, do not perform measurements with wet hands.
- Do not subject the product to strong impacts. Do not hit or forcefully press the pad.
- Turn the power off when not in use, or left unattended.
- Unplug the power cable from its outlet before long periods of disuse.
- Use only genuine Hakko replacement parts.
- Do not modify the HAKKO FG-460.
- Remove power and iron cords by holding the plug. not the wires.
- Thick socks can effect anti-static evaluation. Properly wear anti-static shoes as explained in the instructions provided with the shoes.
- The mounting base is used when using the optional stand, therefore take good care of it.
- While using the HAKKO FG-460, don't do anything which may cause bodily harm or physical damage.

4. PART NAMES



* Refer to the "**● About evaluation external output**"



⚠ CAUTION
When setting up the test plate, make sure the toes are facing towards the "UP" sign on the center divider.

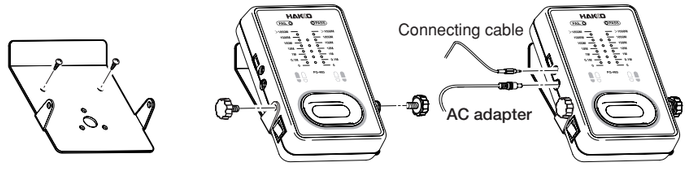
5. INITIAL SETUP

NOTE :
The HAKKO FG-460 can be installed on a desk, wall or the optional stand.

● **Mounting on the wall**

1. Install the mounting base as shown in the diagram using the included wood screws or pan head screws.
2. Place the HAKKO FG-460 on the mounting base and secure it to the base using the included mounting screws.
3. Plug the connecting cord from the test plate and the AC adapter plug into the respective jacks on the left side of the HAKKO FG-460.
4. Plug the AC adapter into a wall outlet.

⚠ CAUTION
Unplug the power cable from its outlet before long periods of disuse.



6. OPERATION

⚠CAUTION

During measurement, the HAKKO FG-460 passes a very small amount of electric current through a person's body. People who have weak hearts or are using a pacemaker should not use the HAKKO FG-460.

● Measurement

1. Set power switch to ON. The indicator LEDs for the set pass range will light.
2. Put on the anti-static shoes and step on the test plate, being careful not to mix up left and right shoes.
3. Gently press on the pad of the Hakko FG-460 main unit with three fingers.
4. The left foot will be measured first, followed by the right foot.

⚠CAUTION
Measurement of the left foot will start from the center of the pass range or one step below the center (if the LED range is even).

Example) If the pass range is 0.1MΩ ≦ R ≦ 1000MΩ, measurement will start from 10 MΩ ≦ R ≦ 100 MΩ.

⚠CAUTION
Measurement of the right foot will start from the range used for measurement of the left foot. Doing this reduces measurement time because if there are no problems with the shoes the shift in range will be minimal.

5. The evaluation result will be displayed.

⚠CAUTION
If you remove your hand from the pad before measurement is completed, a buzzer will sound 3 times and the evaluation result will not be shown. Perform measurement again.

6. After checking the evaluation result, remove your hand from the pad and step off of the test plate.

⚠CAUTION
Moving your feet while on the test plate or not making full contact with your fingers on the pad can result in an incorrect evaluation. During measurement, remain still on the test plate and press the pad firmly with 3 fingers.

* Although the HAKKO FG-460 can be used without being connected to ground, depending on conditions the ground terminal on the left side of the HAKKO FG-460 (refer to the "**4. PART NAMES**" for the terminal location) can be connected to ground.

● When PASS LED is lit

It indicates that the resistance of the anti-static shoes and the person wearing them is inside the set range. The resistance range of the shoes at that time is indicated by the LED lamps, therefore the characteristics of the anti-static shoes can be checked.

● When FAIL LED is lit

It indicates that the resistance of the anti-static shoes and the person wearing them is outside the set range. Determine the cause and take actions including replacing the anti-static shoes, etc.

※If the measured value is below the lower limit

Example) Soles are worn down.
A piece of metal is stuck in the sole.

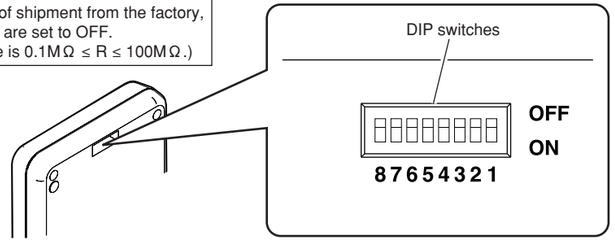
※If the measured value is above the upper limit

Example) Thick socks are worn.
Defective shoes, dirty soles, etc.

● Setting various settings using DIP switches

Settings such as upper and lower evaluation limits, evaluation buzzer, etc. can be made by setting the DIP switches on the back of the Hakko FG-460 main unit ON or OFF.

⚠CAUTION
At the time of shipment from the factory, all switches are set to OFF.
(Pass range is 0.1MΩ ≤ R ≤ 100MΩ.)



6. OPERATION

⚠CAUTION
Be sure to set the power switch to OFF before changing DIP switch settings.

DIP switch settings table

Setting content		DIP switch number							
		8	7	6	5	4	3	2	1
Conductivity evaluation*	R ＜ 0.1 MΩ							ON	ON
Lower evaluation limit	R ＜ 0.1 MΩ							OFF	ON
	0.1 MΩ (1×10^5 Ω)							OFF	OFF
	1 MΩ (1×10^6 Ω)							ON	OFF
Upper evaluation limit	10 MΩ (1×10^7 Ω)					OFF	ON		
	100 MΩ (1×10^8 Ω)					OFF	OFF		
	1000 MΩ (1×10^9 Ω)					ON	OFF		
Evaluation buzzer	Buzzer ON when PASS				OFF				
	Buzzer ON when FAIL				ON				
Evaluation external output	External output when PASS			OFF					
	External output when FAIL			ON					
Function disabled**						ON	ON		
			ON						
		ON							

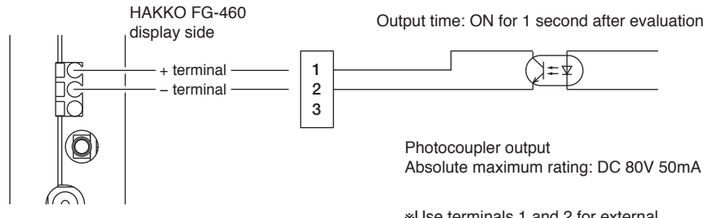
* If both switch 1 and 2 are set to ON, it is not possible to set the upper evaluation limit.
**If both switch 3 and 4 are set to ON, or if switch 7 or 8 is set to ON, the main unit cannot be used.

※ JIS T 8103 defines different standard values for conductive shoes, general-purpose anti-static shoes, and special anti-static shoes. The pass range setting corresponding to each type of shoe can be set by changing the DIP switch settings.

● About evaluation external output

There is an external output terminal on the left side of the HAKKO FG-460 main unit. The evaluation result can be output from this terminal.

The output circuit is as shown below. The DIP switches can be set to perform output when evaluation result is PASS or FAIL.



DIP switch 6
OFF: External output when evaluation is PASS
ON : External output when evaluation is FAIL

※Use terminals 1 and 2 for external output.
(Refer to the **"4. PART NAMES"** regarding terminal 3.)

Evaluation external output terminal block (usage conditions)

Model			XW4C-03E1-H1 (Omron product)
Wire stripped length			10 mm
Suitable wire	Single wire		0.2 mm² ～ 4.0 mm²
	Twisted wire		0.2 mm² ～ 2.5 mm²
	Bar terminal	(Without sleeve)	0.25 mm² ～ 2.5 mm²
		(With sleeve)	0.25 mm² ～ 1.5 mm²
	AWG		24 -12

6. OPERATION

・About connecting to terminal block

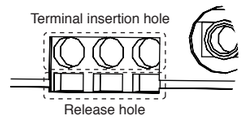
Example) When connecting wire directly

①Use a wire size corresponding to the suitable wire.

②Strip off 10mm of the insulation from the end of the wire and twist the wire end together.

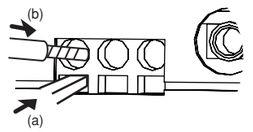
⚠CAUTION
If the wire end is pre-soldered, proper connection will not be possible.

③The terminal block has a release hole and a terminal insertion hole. (See figure at right.) Insert a tool such as a screwdriver, etc. into the release hole. (a)



④Insert the stripped end of the wire into the terminal insertion hole. (b)

※When removing the wire, insert a tool such as a screwdriver, etc. into the release hole and pull out the wire.



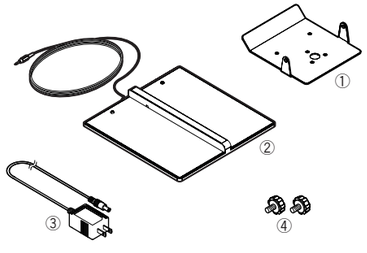
7. TROUBLE SHOOTING GUIDE

⚠WARNING
Disconnect the AC adapter before service/maintenance procedures. Failure to do so may result in electric shock.

● Product does not operate even when power is switched on.	**CHECK** : Is the AC adapter and/or connecting cable disconnected? **ACTION** : Connect it.
● The pass range LEDs do not light.	**CHECK** : Is the DIP switch settings are correct? **ACTION** : Refer to the DIP switch settings table and set the DIP switches ON and OFF.
● The buzzer just sounds 3 times and no evaluation result is shown.	**CHECK** : Do not release quickly the hand from the pad? **ACTION** : Keep your fingers on the pad until the evaluation result of PASS or FAIL is finalized.

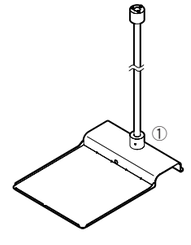
※If a problem other than those listed above occurs or if the problem continues even after performing the solution, contact the dealer from which you purchased the product.

8. PARTS LIST



● HAKKO FG-460

Item No.	Part No.	Part Name	Specifications
①	B5116	Mounting base	with screws
②	B5117	Test plate	
③	B5118	AC adapter	Chinese plug
	B5119	AC adapter	BS plug CE
	B5120	AC adapter	European plug CE
	B5121	AC adapter	Australian plug
	B3528	AC adapter	
④	B1991	Mounting screw	2 pcs.



● Optional Parts

Item No.	Part No.	Part Name	Specifications
①	C5032	Stand	