

The ESD-Audit-Kit includes the relevant test instruments for the verification of the ESD control elements according to IEC 61340-5-1 in an ESD protected area (EPA)

Applications

- Evaluate packaging materials
- Evaluate garments
- Measure flooring, working surface and furniture resistance
- Measure electrostatic fields
- Measure temperature and relative humidity
- Analyze ionizers performance



Rugged aluminium case for test instruments and equipment



- Aluminium embossed conductive surface
- Conductive foam inserts
- Upper compartment with a flap
- Removable, telescopic handle with castors
- ESD symbol
- Dimensions: 575 x 490 x 250 mm
- Weight: 7 kg

Part Nr.

7110.585 (only case)



Part Nr.

7110.585.SET	includes:
7110.585	Aluminium case
7100.2000.G*	High resistance meter with connecting cables
7100.2000.IRU	Infrared USB interface adapter
7100.2000.TF	Temperature and humidity sensor
7220.45	Handheld probe model 45
7220.840*	Two-Point-Probe model 840 (Mini Probe)
7220.880*	Ring probe model 880
7100.M.H110	Multimeter Hexagon 110 with connecting cables
7100.SRM110*	Surface Resistance Meter SRM 110
7100.EFM51.CPS*	Electrostatic Field Meter EFM51 with charged plate set
7220.850	Probe model 850 (2 probes)
2200.110	Grounding plug
7110.E8	8-socket grounding box
7100.2000.TR50	Cable reel, 50 m
7100.PGT100.102	Metal plate 400 x 300 x 2 mm including 10 mm banana plug adapter
7220.880.6	Insulative plate 120 x 120 x 6 mm
7220.880.9	Probe made of stainless steel, ø 120 mm
7220.880.L	Guard cord, blue, 1,5 m

- Weight of fully equipped case: 22 kg

* Measuring equipment including calibration certificate



Metriso[®] 2000 – TEST-KIT (Part No.: 7100.2000.MK.E)

- Suitable for resistance to ground and point-to-point resistance measurements according to IEC 61340-4-1 Ed. 2.0 and IEC 61340-2-3
- Suitable for measuring the electrical resistance of footwear and flooring in combination with a person according to IEC 61340-4-5.
- Integrated data logger for 2500 values and infrared communication port for data transmission
- Clip-on humidity and temperature sensors
- Special guard socket reduces distortion at high value resistance measurements
- Includes two Probes Model 850 according to IEC 61340-4-1 Ed. 2.0 / IEC 61340-2-3 and a handheld probe according to IEC 61340-4-5



Technical data:

Test voltage:	DC 10V, 100V, 250V, 500V
Test range	
Resistance:	$10^3 - 10^{12} \Omega$
Temperature:	-10°C to +50°C
Humidity:	10% to 90%
Operation:	Battery operated or with rechargeable batteries
Probes:	2 x Model 850 1 x Handheld probe Model 45
Size:	140 x 50 x 270 mm (W x H x D)
Weight:	1120 g

Supplied with:

- Digital high resistance tester Metriso 2000
- Infrared interface adapter (USB)
- Communication software
- Humidity and temperature sensor
- 2 Probes Model 850 acc. to IEC 61340-4-1 /2-3
- 1 Handheld probe Model 45 acc. to IEC 61340-4-5
- Connecting cables
- Conductive carrying case
- User's Manual in German / English / French

Technical specifications

Measured Quantity	Measuring range	Test current / Impedance	Nominal values	Intrinsic Error
R_{ESD}	1 k Ω - 100 k Ω	---	$U_M = 10V$	$\pm(5\% \text{ rdg.} + 3 \text{ d})$
R_{ESD}	>100 k Ω - 10 G Ω	1 mA	$U_M = 100V$	$\pm(5\% \text{ rdg.} + 3 \text{ d})$
R_{ESD}	>10 G Ω - 100 G Ω	1 mA	$U_M = 100V$	$\pm(8\% \text{ rdg.} + 3 \text{ d})$
R_{ESD}	0 M Ω - 10 G Ω	1 mA	$U_M = 250/500V$	$\pm(5\% \text{ rdg.} + 3 \text{ d})$
R_{ESD}	0 M Ω - 100 G Ω	1 mA	$U_M = 250/500V$	$\pm(8\% \text{ rdg.} + 3 \text{ d})$
R_{ESD}	>100 G Ω - 1 T Ω	1 mA	$U_M = 100/250/500V$	$\pm(25\% \text{ rdg.} + 5 \text{ d})$
U_M	0 V - 720V	5 M Ω	---	$\pm(2,5\% \text{ rdg.} + 3 \text{ d})$
T	-10 $^{\circ}C$ - +50 $^{\circ}C$	---	---	$\pm 2^{\circ}C$
F_{rel}	10% - 90 %	---	---	$\pm 5\%$

Power supply, battery life expectancy:

The instrument is supplied including the batteries (4 x 1,5 V baby cells)

Battery life is about 3000 measurements at R_{ESD} with one set of batteries.

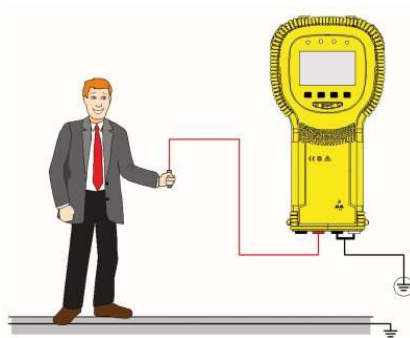
(With 10 sec. on-time and performance of one measurement before each automatic instrument shutdown)

- ▶ 1 year limited warranty
- ▶ Recommended calibration interval: 2 years

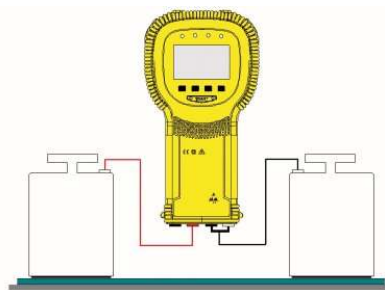
Accessories (optional):



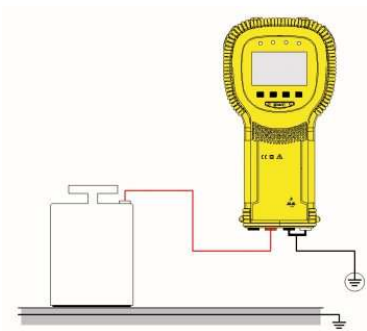
Part No.
7100.2000.TR50
50m Cable reel with unroll handle for floor measurement



R_G system
Resistance of person /
ESD shoes / flooring to ground



R_{P-P}
Point to Point Resistance



R_G
Resistance to ground or groundable point



Warmbier Germany, Electrostatic Field Meter EFM51

Warmbier P/N: 7100.EFM51

- Handheld, portable, digital electrostatic field meter with rotating chopper
- Detects and accurately measures electrostatic fields
- Measures: fields, potentials and discharge time
- Automatic field to voltage conversion according to selected distance
- Very stable zero adjust

Technical data:

- Power supply: 9V battery IEC6F22 or rechargeable battery
- Range: 0 - 160 kV / 0 - 800 kV/m
- Display: 2 row LCD-display
- Dimension: 70 x 122 x 26 mm (W x L x H)
- Weight: 130 g (without battery)



Supplied with:

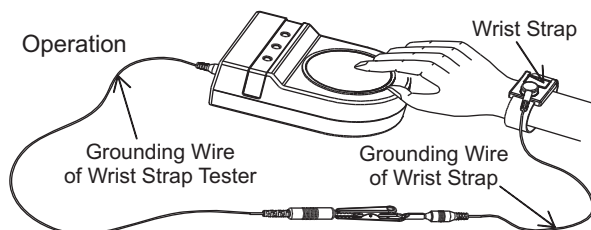
- 9V battery
- Grounding cable
- Carrying bag
- User Manual
- Calibration certificate

Distance:	Range:	Max. resolution
1 cm	0 - 8 kV	1 volt
2 cm	0 - 16 kV	2 volts
5 cm	0 - 40 kV	10 volts
10 cm	0 - 80 kV	10 volts
20 cm	0 - 160 kV	20 volts
E-Field mode	0 - 800 kV/m	100V/m
CPS mode	1.000 to 100 volts	0,1 sec.

Wrist Strap Tester

Inde P/N: ISM-498

- Use anywhere to check personnel ESD grounding quickly
- Checks contact resistance between Wrist Strap and skin
- Power Supply: 9V Battery • Grounding Wire: 2.5 meter



Simply touch circular surface on Tester with your hand and connect ground wire. In case of a safe ground, LED will be 'Green'. Opposite Table summarizes test indications.



LED Indication	Resistance	Buzzer
Power Low (Red)	< 750 KΩ	OFF
Good (Green)	750KΩ ~ 10MΩ	ON
High (Red)	> 10 MΩ	OFF

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Replacing the Battery

Replace the 9V battery when "Low Battery" appears on the display. Please switch off the unit before opening the battery compartment. Remove the battery and carefully disconnect the contact-clip. Plug the contact-clip onto the new battery and put it back into the compartment; then close the compartment.

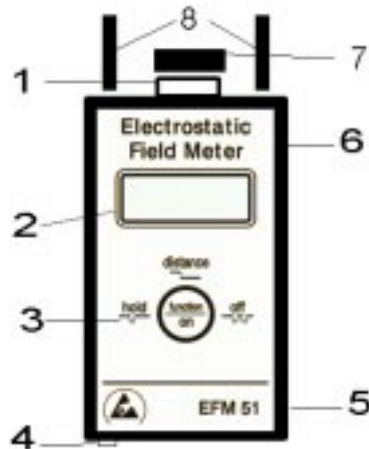
Warning

The unit is not approved for usage in explosive areas!
The usage in power plants is not allowed!
This unit cannot measure alternating fields > 1 Hz!
The Instrument must be grounded when high electrostatic charges are present.
Sparking on the modular system can cause damage to the unit and need to be avoided.

The EFM51 includes:

- Electro Field Meter EFM 51 including the 9V battery and 2 cm distance guides
- Storage Bag including grounding cable and clip
- User's manual in German and English
- Calibration Certificate

Legend



1. Rotating chopper
2. LCD – Display (2 x 12) alphanumeric
3. Function/on key
4. Grounding Socket (4mm)
5. Battery compartment (back-side)
6. Zero adjustment trimmer
7. Protection cap
8. Distance guides (removable for E-Field mode)

Electrostatic Field Meter - EFM 51

V0805



Small hand-held Electrostatic Field Meter with digital display designed to measure electrostatic charges and fields according to the field mill induction principle.

- The instrument measures the electrostatic voltage potential. A microcontroller calculates the field strength (V/m) with the pre-selected distance (1cm, 5cm, 10cm and 20cm).
- In "E-Field meter" mode, the instrument displays the field strength in "kV/m"

Measurement Principle

The induced charge caused by the electrical field, generates a current proportional to the electrical field strength. The selective, parametric operating-amplifier measures the current without affecting the averaged time. There are no radioactive components inside the unit.

Technical Data

Dimensions: 70 x 122 x 26 mm (B x L x H)

Weight: 130 g (without battery)

Power Supply: 9V – Alkaline battery IEC 6F22 or rechargeable NiMH battery

Measurement Range:	distance 1 cm	→	0..... 8 kV	max. resolution 1 V
	Distance 2 cm	→	0..... 16 kV	max. resolution 2 V
	Distance 5 cm	→	0..... 40 kV	max. resolution 10 V
	Distance 10 cm	→	0... 80 kV	max. resolution 10 V
	Distance 20 cm	→	0... 160 kV	max. resolution 20 V
	E-Field meter	→	0... 800 kV/m	max. resolution 0,1 kV/m

Display: 2 lines, 12 digits alphanumeric LCD display

Operating Time: app. 10 hours at continuous operation with an Alkaline battery

Adjustment: Within a plate capacitor's homogeneous field, plate size 200 mm x 200 mm, distance between both plates is 20 mm, the rotating chopper system is centered in the grounded plate.

Warranty

We provide 12 months limited warranty.

The warranty does not include the battery, mechanical damage or unauthorized opening of the instrument.

Operating instructions

Operation

- Press the „function/on“ key “shortly” to switch on the instrument
- Press the key twice while in measuring mode to switch off the instrument
- Remove the protection cap before a measurement
- The unit will switch off automatically when the „function/on“ key was not pressed for app. 4 minutes (in CPS-Mode app. 18 min.)

Hold Function

The hold-function freezes the display with the actual measured value.

- Press the „function/on“ key “shortly” while in measuring mode for “hold”.
- Press the key while in “hold” to return to measuring mode.

Measuring Ranges

1. Measurement of electrostatic voltages:
The instrument is preset to 2cm distance after switching on. To measure, it must be positioned at 2 cm distance in front of the object. For high voltages or uneven surfaces the measuring distance should be increased.
2. E-Field meter mode
The instrument indicates the field strength in V/m for the current position.

Measuring Distance / Measuring mode

Press and hold the „function/on“-key (approximately 2 seconds) until „change cm“ will appear. The pre-selected distance in cm is displayed in the first line. Pressing the „function/on“-key changes the measuring distance.

2cm => 5cm => 10cm => 20cm => E-Field meter => CPS-Mode => 1cm

After selecting the desired distance or mode, the instrument switches back to measuring mode if no key is pressed for a certain time.

Important!

The measuring range is preset to 2cm distance each time the instrument is switched on!

The instrument measures the field strength in V/m and calculates the voltage using the selected range:

Display value (V) = Field strength (V/m) x Distance (m)

i.e.. Display value= 1000V Distance= 10cm → 1000V = 10000 V/m x 0,1m

In “E-Field meter” mode the instrument displays the field strength in “kV/m”.

Distance guides

The instrument is supplied with two 2cm distance guides which are fitted on the front plate.

The alphanumeric Liquid Crystal Display (LCD) consists of 2 lines of 12 digits each. The measured distance in cm or the measuring mode is displayed in the first line, while the test result is displayed in the second line. An „overflow !“ indication requires to increase the distance.

Battery control

The EFM 51 has a permanent battery-voltage-control. If the battery voltage falls below 7,5 V a „Low Battery“ warning appears and the 9V Battery must be replaced!

In case the battery falls below 7,0 V the instrument switches off with „auto off“ message to avoid total discharge and acid leakage.

Note: Please use Alkaline or Lithium 9V Batteries only!

If rechargeable batteries are preferred, please use a suitable battery charger for charging the battery separately and follow the manufacturer's instructions.

Grounding

The unit must be connected to ground to allow accurate voltage levels and polarity measurements. Use the grounding socket (4) for ground connection. The unit housing is conductive, and the instrument may be grounded through the operator if he is at ground potential.

Zero Adjust

in general , zero adjustment is not necessary. However the trimmer (6) can be used for zero adjust if the instrument does not indicate U=000 or U=00X when the rotating chopper is shielded by the protection cap. The last digit can be ignored, as it is much lower than the specified tolerance.

Maintenance

It is very important not to touch any parts of the rotating chopper. The sensor head must be free of dust and humidity.

If needed, the rotating chopper be cleaned with alcohol and a lint-free tissue, when switched off.

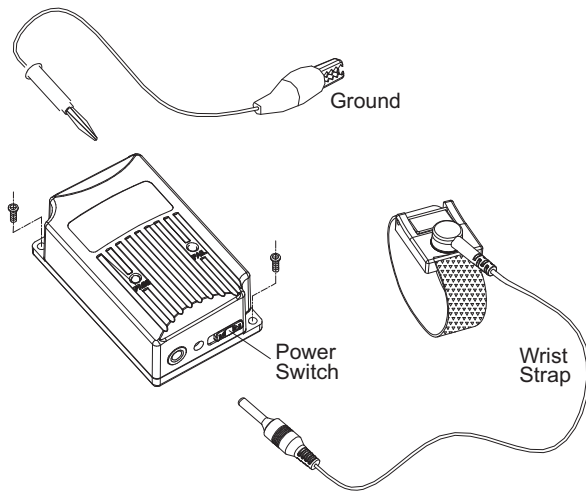
Deforming the rotating chopper will damage the instrument!

Inde P/N : ISM-495

Continuous Wrist Strap Monitor

Inde ISM-495 monitors ESD integrity of operator and ground. Provides instant notification of the wrist strap or ground failure. When the production process is of very high value, reliable ESD safety and ground is must for continuous monitoring at operator level.

- Continuously monitors the wrist strap integrity
- Continuously monitors the grounding integrity
- Sound and light alarm
- Portable and compact, easy to use
- Output Voltage : 8 – 12 VDC
- Mounting holes to mount on the table
- Weight : 50g approx
- Dim: 75(L) x 46(W) x 27(H) mm



Operation:

Connect grounding lead and switch on power. Put on wrist strap and put the banana-plug into Wrist Strap Monitor. Turn ON switch. 'CAL' if needed. The Tester is now continuously monitoring the wrist strap and ground. In case of any problem with wrist strap or ground, alarm is sounded and light turns red.

LED	Value
OK (Green)	825KΩ ~ 9MΩ
Fail (Red)	11MΩ and above
Fail (Red)	765KΩ and below

Warmbier Model : SRM 110

Warmbier Germany, Surface Resistance Meter

(Part No.: 7100.SRM110.A)

Pocket size, lightweight, auto ranging surface resistance meter for verification of conductive and dissipative materials. Internal parallel metal electrode. External probes can be connected.



Specifications

- LED: 10 lights
- Low Battery: LED flashing
- Battery: 9 volts
- Range: $10^3 - 10^{12} \Omega$
- Accuracy Range: +/- 10%
- Size: 130 x 65 x 31mm
- Weight: 240g



Sockets for external probes

Supplied with:

- Instrument SRM 110
- Carrying bag
- 9V-battery (installed)
- Grounding cord
- User's manual
- Calibration certificate

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User's Manual



Surface Resistance Meter **SRM 110**

Wolfgang Warmbier
Untere Gießwiesen 21
D-78247 Hilzingen
www.warmbier.com

Introduction

The SRM110 is a pocket size, lightweight, auto ranging surface resistance tester. Its internal parallel electrodes comply with **DIN EN 100 015/1**. IEC electrodes can be externally connected for tests according to **IEC 61340-4-1**. The measuring voltage is auto-ranging 10V to 100V.

Operation Instruction

Measuring Surface Resistance

- To measure the surface resistance of an object, hold the instrument to the surface and press the "TEST" button.
- The value is indicated with 12 LED's, in different colours.

The LED's indicate:

LED	Range	Definition
Green	$< - 10^5 \Omega$	Electrostatic conductive
Yellow	$10^6 - 10^{11} \Omega$	Electrostatic dissipative
Red	$10^{12} \Omega - >$	Electrostatic insulating

Measuring Resistance to Ground

- Plug in the supplied grounding cord at one socket of the instrument. The associated internal electrode is disconnected hereby.
- Connect the opposite end of the grounding cord to "ground" or a "groundable point".
- Hold the instrument to the surface like described above and press the button.

Other Measurements

By connecting external electrodes to the instrument's sockets it is possible to measure for example "point to point" resistance, or "volume resistance".

Packing List

The SRM 110 includes:

1. Instrument SRM110
2. Carrying bag
3. 9V battery (installed)
4. Grounding cord
5. User's manual
6. Calibration certificate

Technical Data

Dimension:	130 x 65 x 31mm (L x B x H)
Weight:	240 g
Power supply:	9V battery or NiMH rechargeable battery
Test range:	$10^3 - 10^{12} \Omega$
Test voltage:	10V / 100V (automatic ranging)

Notice

This instrument is **not** approved for measurements in explosion hazard areas!

High electrostatic charges or measuring insulating highly charged materials might damage the instrument!



Using the instrument in power plants is **not** permitted.

Maintenance

When the (>)-LED flashes during measurement, it is due to replace the 9V battery. Open the back cover of the instrument by unscrewing the four screws. Take care of the polarity.

Calibration

The recommended calibration interval is 2 years.