

# MANUAL

---



## Wrist Strap-and Shoe tester WST 100

---

Performance test for Electrostatic-Wrist Straps and Conductive Shoes

## Contents

Description .....	2
Specification .....	2
Function .....	3
Wrist strap test.....	4
Shoe test.....	4
Adjustable abilities .....	<b>Fehler! Textmarke nicht definiert.</b>
Statistical error memory.....	5
Limits.....	5
Change Battery.....	5
Connection .....	6
Shoe electrode connections .....	6
Connecting a door-opener .....	6
Scope of supply WST 100 SET.....	7
Optional accessories .....	7
Calibration.....	8
That offers great advantages:.....	8
Adjust the Limits.....	9
Error .....	10
Short Instruction .....	12

## Description

The WST100 serves the function test of electrostatic wrist straps and conductive footwear. Before you get access to ESD-secured areas the ESD precautions like wrist strap and conductive footwear should be tested for correct functioning.

The WST-100 is a reliable and advantageous solution for this.

The appliance is portable and because of its battery power employable everywhere.

The setting of the limits and the calibration can be done by the customer himself, very simply.

A special feature is the appliance possesses a statistical error memory, in which the errors of statistically appraised are stored.

Hand appliance in a plastic housing 150mm x 88mm complete  $\mu$ C controlled.

The shoe electrode for this unit is 370mm x 440mm of a plastic plate which includes 2 shoe electrodes for the left and right shoe separately.

The display includes 7 LEDs a green LED (8mm) for o.k. and 6 red LEDs for error message. For the additional acoustic signal a buzzer is integrated.

The appliance possesses an integrated relay 60V / 0,5A (in the shoe electrode).

With the optional plug charger and NiMH accumulators, the appliance can be run permanently.

## Technical specifications

<b>Dimension (L x B x H):</b>	Hand appliance: 150mm x 88mm x 35mm Shoe Electrode: 440mm x 370mm x 35mm
<b>Weight:</b>	Hand appliance: appr. 250 g Shoe Electrode: appr. 2 kg
<b>Power supply:</b>	4 x Mignon (AA) <b>Alkaline</b> in the hand appliance Optional: plug power adapter 7,5V-DC / 300mA via Shoe Electrode with 4 x Mignon Battery NiMH (rechargeable)
<b>Display:</b>	1 LED (8mm) green, 6 LEDs (5mm) red, 1 buzzer
<b>Relay contact: (included in the shoe electrode)</b>	potential-free contact (60V/0,5A)
<b>Principle of Measurement:</b>	Current / Voltage Converter
<b>Measure Voltage</b>	20V ±5%
<b>Connection:</b>	:All connections via 9-pin Sub-D Connector
<b>Limits</b>	The limits are separate adjustable for the wrist strap test and the shoe test

**Setting range:** Lower limit from 0.... 2MΩ

Upper limit from 5.... 200MΩ

**Special limits are possible if needed by the customer!**

## Function

The testing person should stand with both shoes on the contact plates at the shoe electrode. The Wrist strap-cables are plugged into the measuring instrument. Then press and hold the Test-Plate on the appliance with a finger.

When starting the measurement, a short acoustic signal sounds.

At first, the resistor of the Wrist strap is measured, after it the resistors from the left and from the right shoe. It is tested whether the resistance values are within the lower and upper limits. If all resistance values are between the lower and upper limits, a short acoustic signal sounds and the green LED lights up.

If one or several resistance values is outside of the lower or upper limit, no acoustic signal sounds, only the appropriate red < or > LED lights up.

Also several mistakes can be represented simultaneously.

For example: Wrist strap > and Shoe left <

If the Test Plate is free, the display LEDs lights approximately 2 Seconds longer, then the appliance switch off.

## Wrist strap test



If the wrist strap test is selected, put the wrist band on and connect the grounding cord to one of the lower wrist strap sockets.

Depress and hold the metal contact plate until a LED appears or the buzzer sounds

If none of the both wrist strap LEDs lights up the wrist strap is o.k.

If the red “<” LED is on, the current limiting resistor in the ground cord is out of tolerance and the ground cord has to be replaced.

The “>” LED indicates that the resistor range is exceeded. First check the grounding cord. Leave the plug end attached to the tester and disconnect the snap end from the wrist band.



Connect ground cord snap to the stud in the hand symbol and depress the metal contact again to start a new measure. If no red wrist strap LED shines, the ground cord is o.k. In this case you have a problem with the wrist band or the contact between the skin and the wrist band. This resistance may be caused by extremely dry skin or the presence of hair. The use of a skin lotion is recommended to solve this problem. If a red “>” LED condition still exists, replace the wrist band.

## Shoe test



Stand with both feet on the left and right electrode of the shoe electrode. Depress the metal contact plate and hold until a LED appears.

If no one of the shoe right/left LED light up → shoe(s) o.k.

If the red LED (shoe right/left) “>” is illuminated, clean the sole of the right/ left shoe or check your right/left shoe grounding system and retest. If the red LED (shoe right/left) “>” remains on, replace your shoes or grounding system. If the red LED (right/left) “<” is illuminated, the minimum resistance of your right/left shoe or grounding system is too low. Maybe, that your shoe are wet, then dry them otherwise replace your shoes or grounding system.

The wrist strap test does not influence the shoe tests. After pressing the metal plate the selected tests from the test mode will run step by step.

## Adjustable abilities

### *In the Set-Up – Mode you can choose different functions*

#### **Test - Mode:**

- Only wrist strap test without Shoe - Test
- Only Shoe - Test with double shoe electrode
- Wrist strap and Shoe - Test with double shoe electrode
- Wrist strap and Shoe - Test with single shoe electrode

#### **Relay - Mode:**

- Alarm function (Relay switches on in case of error)
- Door opener function (Relay switches on if o.k.)

## Statistic error memory

The appliance possesses 5 statistical memories for Measurement Number, wrist strap <, wrist strap >, shoes <, shoes >

This works as follows:

After every measurement the measurement number counter increases.

If an error < or > is recognized the error counter < or > increases.

Therefore the following to each memory applies:

Number of the measurements minus errors "<" minus errors ">" = number of the O.K. measurements.

So you will get a statistics statement about the quality of the wrist straps and the shoes!

## Limits

The lower and upper limits are fixed by lower and upper calibrated resistors.

Factory default is:	wrist strap test	lower limit	750k $\Omega$
		upper limit	35 M $\Omega$
	Shoe test	lower limit	100k $\Omega$
		upper limit	100M $\Omega$

Other limits are possible without extra charge. The limits can be changed by the customer anytime → see adjustment of the limits.

## Evaluation

lower limit	Calibrated Value (LCV)	→	LED <
	Calibrated Value (LCV) + 10%	→	LED o.k.
upper limit	Calibrated Value (UCL) - 10%	→	LED o.k.
	Calibrated Value (UCL) + 10%	→	LED >

## Change Battery



The appliance possesses battery supervision. If the battery voltage is below the limit, an acoustic signal sounds with approximately 1Hz. In this case the batteries must be change.

The battery compartment is on the underside of the appliance. When installing in new batteries look for the polarity!!

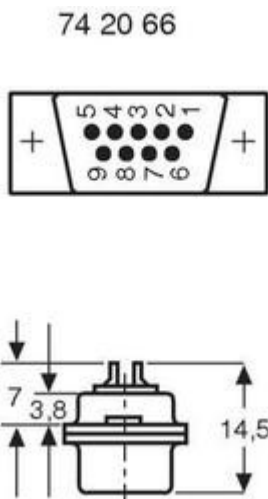
**Important! Use alkaline batteries only!**

### Connection

The connection with the appliance takes place at a 9pol.Sub D pin jack. Connecting to this is the shoe electrode, the optional Power supply, the relay output and the serial PC – Interface.

Only one single cable is needed to connect to the hand appliance

### Pin asignment



- 1 = U+ from power supply
- 2 = PC Out
- 3 = PC In
- 4 = shoe electrode left shoe
- 5 = GND (U- power supply)
- 6 = + measuring voltage 20V=
- 7 = Relay contact
- 8 = wrist strap
- 9 = shoe electrode right shoe

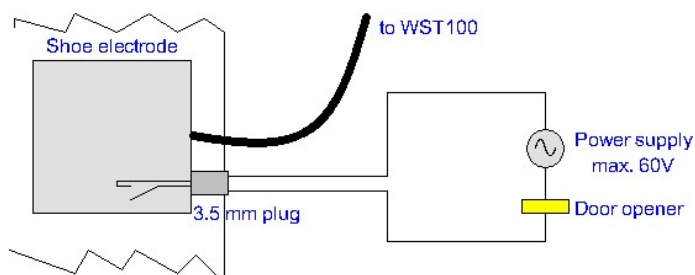
### Shoe electrode connections



At the front-side of the shoe electrode are the plugs for the power supply (right) and for the relay output (left) ( Relay contact 60V / 0,5A potential-free)

Cable to the hand unit

### Connecting a door-opener



## PC Interface

To using the PC interface unplug the plug to the shoe electrode and contact the PC – Cable.

**Warning! Use the special WST-100 PC - cable only !**

## Scope of supply WST 100 SET

- Hand instrument WST 100
- Shoe electrode WST 100 SE
- 4 x Batteries AA Mignon Alkaline
- Manual
- Calibration Certification

## Optional accessories



### WST-100 RE

Calibrated Resistor for the lower and upper limit with Certification of Calibration.

wrist strap	– Standard -	lower limit 750k $\Omega$	upper limit 35M $\Omega$
Shoe	– Standard -	lower limit 100k $\Omega$	upper limit 35M $\Omega$

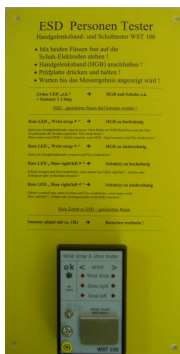
We can deliver each pair of limits into the limit range without extra charge !



### WST-100 NT

The charger set includes 4 x NiMH Mignon batteries and a plug power supply which is connected to the shoe electrode.

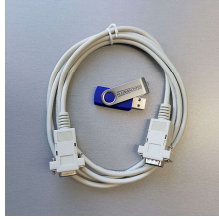
**Important ! Before using the power supply replace the alkaline -batteries with rechargeable NiMH types.**



### WST-100 WB

Wall connecting plate with testing instruction.  
Front side German / back side English.

The fixation from the WST 100 on the board proceeds by Velcro strips (Dual Lock).



### WST-100 PC

Including the PC cable with USB Stick with KL\_ReadOut Software. To Retrieval and erasure of the statistical EEPROM-Memory. Excel – Software on Disk/CD to read out the statistical error memory.

### Calibration

By using calibrated resistors by doing a new calibration and the result is saved in the EEPROM, this is also a calibration.

With this calibrated resistors you can calibrate all your units at the user's site...

**recommended test cycle time: annually**

### That offers great advantages:

#### **ESD Standard changing !**

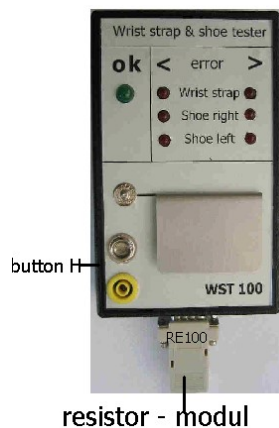
**By using the new resistor values, you can change the limits at the user's site !**

#### **Calibration !**

**By using calibrated resistors, you have only to recalibrate this. Than calibrate your instruments by yourself.**

**No shutdown period and very cheap !!**

# Adjust the limits/Calibrate the instrument



**Is required according to function:**

**Calibrated resistor pairs for wrist strap and/or shoe test**

## Sequence

- Press and hold button H (hidden), with a small screw driver
- Press the test plate shortly → buzzer sounds!
- Release the button H
- Release the test plate

**Set-Up Mode** → operating mode puts in:

- By pressing the test - plate you now can change the operation mode:
  1. All red LED's → Wrist strap + shoe right + left test
  2. Only wrist strap LED's (<>) → Wrist strap test only
  3. Wrist strap+shoe right LED's (<>) → Wrist strap + shoe right test ( single shoe Electrode )
  4. Shoe right + left LED's (<>) → Only shoe right / left test ( without wrist strap )
- Through short pressing the button H your selected operating mode is saved.
- By pressing the test plate you can select now the relay mode
  1. Only green LED → Relay is in door open mode (switch on by o.k.)
  2. All red LED's → Relay is in Alarm mode (switch on by error)
- Through short pressing the button H your selected relay mode is saved.
- The buzzer sounds for approximately 1 second, than all LED's lights.
- Through pressing the Test Plate (> 1sec), the Set-Up can now be left.
- Through short pressing the button H you can continue with the adjustment of the limits.

**Set-Up Mode** → Read Calibration Resistors :

- **The LED wrist strap < lights up.**  
(only if wrist strap is tested).
- **Connect calibration resistor module for wrist strap limits,**
- **Press briefly button H.**
- **If value is O.K., the green LED lights up (+ buzzer for 1 seconds),**
- **afterwards the LED wrist strap > lights up.**
- **Press briefly button “H”.**
- **If the value is O.K., the green LED lights up (+ buzzer) for 1 second**
  
- **afterwards LEDs shoe right < and shoe left < lights up.**  
(only if Mode „Only Wrist strap“ is not selected)
- **Connect the calibration resistor - module for shoe limits**
- **Press briefly button H.**
- **If value is O.K., the green LED lights (+ buzzers) for 1 seconds,**
- **afterwards the LED`s shoe right/left > lights.**
- **Press briefly button H.**
- **If value is O.K., the green LED lights.**
- **The new limits are saved**
- **By pressing the test - plate the WST-100 switches off**

*Limit ranges :*

lower limit : 0 ..... 2 MΩ

upper limit : 5 ..... 200 MΩ

Special ranges are available!

## Error

If a connected calibration resistor is out of these ranges, all 6 red LEDs flash..

5 x                      →      Error Calibration Value

After that the unit switches off.

**Important!** In this case you must repeat the complete Set – Up !!!

### **Calibration**

Since the values are written directly with the adjustment into the EEPROM, the adjustment of the limits with calibrated resistors is also simultaneously the calibration of the appliance.

In order to return to the normes, the calibrated resistors can be calibrated by the manufacturer annually.

With these calibrated resistors, all appliances of the customer can then be calibrated again.

Suggested calibration cycles: annual

### **Calibrated Resistor Module RE-100**

A calibrated resistor modulo consists of a 9-pin Sub-D Plug with the calibrated resistors for the lower and upper limits the following standard - modules are offered:

A	lower limit 100k $\Omega$	upper limit 35M $\Omega$
B	lower limit 750k $\Omega$	upper limit 35M $\Omega$

Every desired resistance combination within the limit ranges can be delivered without extra charge!



## Short Instruction



**Stand with both feet solidly on the electrodes!**

**Connect the wrist strap !**

**Press and hold the test plate!**

**Wait until the test - result is shown !**

Green LED o.k.



Wrist strap and Shoes o.k.

buzzer = 1 x long

**ESD-secured area can be entered !**

---

One or more red LEDs >  
impedance



wrist strap or Shoe to high  
impedance

One or more red LEDs < →

wrist strap or Shoe to low impedance

**ESD – Entry !!**

