

## IX. Packing list

Clamp- on ground resistance tester	1 piece
Verification Resistor	1 piece
AA 1.5V dry cell	4 pieces
Carry case	1 piece
Operation instruction	1 piece
Certification	1 piece

# Clamp-on GROUND TESTER

## MANUAL

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## I. Attention

Thank you for purchasing clamp-on ground resistance tester. In order to have better experience with this product, please be certain:

---To read this user manual carefully.

---To comply with the operating cautions presented in this manual.

- Under any circumstances, pay special attention to safety in the use of the Meter.
- Do not exceed the measuring range and endenviroment provided.
- Pay attention to text labeled on front panel and back plane of the meter.  
Before booting up, trigger should be pressed for a couple of times to ensure jaws are well closed.
- DO NOT OPERATE the trigger or clamp wires during boot-up stage.
- Measurement can be performed only when LCD shows 'OL' after sel in spenction in boot-up stage.

As mentioned before, the reading of clamp on ground resistance tester is referring to earth resistance of every spur track. As long as ground wire is in good contact, the measured resistance represents earth resistance of single grounding body.

In this case obviously, it is meaningless to compare values measured out respectively by traditional voltage & current method and clamp earth resistance tester. Since the object measured is different, it must be different for two results.

(2)Earth resistance measured out by clamp earth resistance tester is integrated resistance of that grounding spur track, which includes the contact resistance, down-lead resistance and grounding body resistance from the spur track to common earth wire. However, even in situation of unclasp, the value measured by traditional voltage & current method only refers to the resistance of grounding body.

Obviously, the measuring value of former is bigger than the latter one. The balance reflects how much of the contact resistance from spur track to common earth wire.

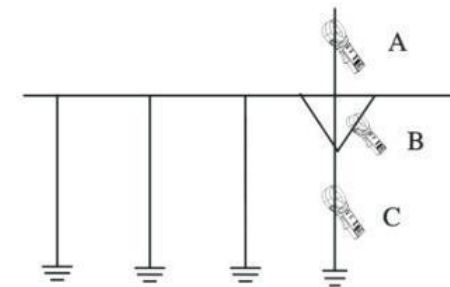
In addition, earth resistance prescribed in industry standards includes resistance of grounding down-lead. It has the following explanation for the term - Earth Resistance of Grounding Equipment: 'summation of resistance to earth of earth electrode or natural earth electrode and resistance of ground lead'.

This kind of regulation is also very definite, for resistance of down-lead and earth resistance of grounding body play an equal role in preventing thunder.

## 2. Selection for measuring point

In some grounding system, as listed in the following chart, a proper point should be chosen for measurement; otherwise different measure results could be got.

When measuring in point A, the spur track measured is out of circuit, the instrument shows 'OLΩ'. In this case a new measurement point should be considered.



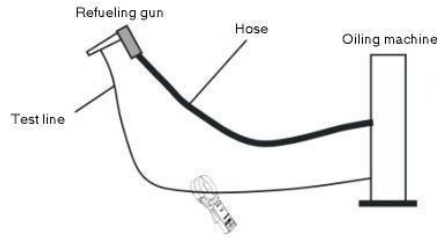
When measuring in point B, the spur track measured is a circuit formed by metal conductor, and it shows 'OL Ω' or resistance value of metal circuit. A new measurement point should be considered.

When measuring in point C, what we measure is earth resistance of the spur track.

instrument. Finally, it is to calculate:  
 Earth resistance of oiling machine:  $R = R_T - R_C$

In which:  $R_T$  is the resistance measured by the instrument;  
 $R_C$  is the earth resistance of loading point.

(3) Measurement of link resistance of oil hose of oiling machine



Connect refueling gun and oiling machine with a test line and measure out the value  $R_T$  with the instrument. We will get:

Link resistance of oil hose of oiling machine:  $R = R_T - R_L$

In which:  $R_T$  is the resistance measured by clamp on ground resistance tester;  
 $R_L$  is the resistance of test line.

## VIII. Important notes for measuring earth resistance

1. It is usual for users to make comparison between testing values measured respectively by clamp on ground resistance tester and traditional method-voltage & current method. It is found that the difference between two methods is rather big. For this problem, kindly please keep following issues as important notice:

(1) Whether unclasp (grounding body to measure is separated from grounding system) has been done when measuring resistance by traditional voltage & current method. If not, the earth resistance that measure refers to parallel connection value of earth resistance of all grounding bodies.

It is meaningless to measure parallel connection value of earth resistance of all grounding bodies. To measure earth resistance is to make comparison between the earth resistance and a permitted value regulated by relevant standards, to decide whether earth resistance is qualified.

In industry standard example: It is definitely stated: 'earth resistance of per radix tower refers to the resistance measured when grounding body cut off electric connection with ground wire. If grounding body doesn't cut off electric connection with ground wire, earth resistance measured refers to parallel connection value of earth resistance of multi-radix towers.'

This regulation is quite definite.

- Keep jaw and jaw contact clean. Pollution will effect accuracy of measurement.
- Keep meter away from any impact, especially jaw contact planes. It is normal that the meter has some sound buzzing during measurement.
- Please remove batteries if long time without operation.
- Disassembling, calibration and maintenance on the Meter shall be operated by the authorized engineer.
- In case of hazards generated itself caused by continuing use, stop using immediately, send to authorized agencies for further operation.

## II. Brief Introduction

Clamp-on ground resistance tester is a major breakthrough in traditional grounding resistance measurement. It is widely used in the grounding resistance measurement of the power, telecommunications, meteorology, oilfield, construction and the industrial and electrical equipment. clamp on ground resistance tester, in the measurement of a grounding system with loop, does not require breaking down the grounding wire, and need no auxiliary electrode. It is safe, fast and simple.

Clamp on ground resistance tester is equipped with a long jaw sized 65mm X 32mm, particularly suitable for the grounding with the flat steel. Besides, can measure leakage current and zero-sequence current with sensitive clamp. It is significant when there is noise signals and harmonic waves in grounding network to measure.

## III. Specification

### 1. Model of Series

	Jaw specification(mm)
	65x32

### 2. Ranges and Accuracy of Measurement

Earth resistance

Range	Resolution	Accuracy
0.010-0.099 Ω	0.001	(±1%+0.01 Ω)
0.10-0.99 Ω	0.01 Ω	(±1%+0.01 Ω)
1.0-49.9 Ω	0.1 Ω	(±1.5%+0.1 Ω)
50.0-99.5 Ω	0.5 Ω	(±2%+0.5 Ω)
100-199 Ω	1 Ω	(3%+1 Ω)
200-395 Ω	5 Ω	(±6%+5 Ω)
400-590 Ω	10 Ω	(±10%+10 Ω)
600-1000 Ω	20 Ω	(±20%+20 Ω)

### AC leakage current

Range	Resolution	Accuracy
0-80mA	0.05mA	( ±2.5%+1mA)
80mA-650mA	0.5mA	( ±2.5%+2mA)
650mA-4A	5mA	( ±2.5%+10mA)
4A-30A	10mA	( ±2.5%+20mA)

### 3. Technical Specifications

Power Source: 6VDC (4 X 5# alkaline battery)

Working Temperature: -10 °C to 55 °C

Relative Humidity: 10%-90%

LCD: 4-digital LCD, 47 X 28.5mm in length

Span of Jaw: 28mm

Meter Quality (including batteries): 1320g

Meter Size: 293mm(L) X 90mm(W) X 66mm(H)

Protection Level: double insulation

Featured: by clamp

Range Shift: Automatic

External Magnetic Field: <40A/m

External Electric Field: <1V/m

Single Measuring Time: 1 second

Maximum resolution of resistance Measurement Resolution : 0.001 Ω

Range of resistance Measurement Range ; 0.01-1000 Ω

Range of current measurement:0.00-30.00A

Frequency of current: 50-60Hz

Number of record sets stored: 99 sets

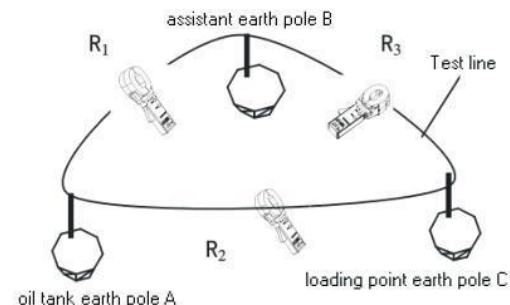
Range for alarm of resistance : 1-199 Ω

Range for alarm of current:1-499mA

### 4. Reference conditions

Conditions	Reference
Ambient	(20 ± 3 °C)
Relative humidity	50%RH ± 10%
Battery voltage	6V ± 0.5V
External magnetic field	<40A/m
External electric field	<1V/m
Operating position	Clamp horizontal
Position of conductor in the clamp	Centred
Proximity to metallic the clamp	>10cm
Loop resistance	Non choke resistance
Rate of distortion	<0.5%
Interference current on measurement of loop resistance	Nil

### (1) Measurement of earth resistance of oil tank and loading point



Shown as the above chart, as for grounding system in gas station, oil tank earth pole A is connected with the oiling machine, and loading point earth pole C is an independent earth pole. Then, find another independent earth pole as assistant earth pole B (such as the underground water pipe, etc), and respectively measure out value of R1, R2 and R3 by clamp on ground resistance tester according to three-point method.

We will get:

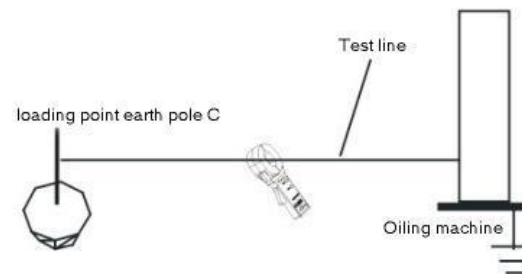
Earth resistance of oil tank:  $R_A = (R_1 + R_2 - R_3)$

Earth resistance of assistant earth pole:  $R_B = R_1 - R_A$

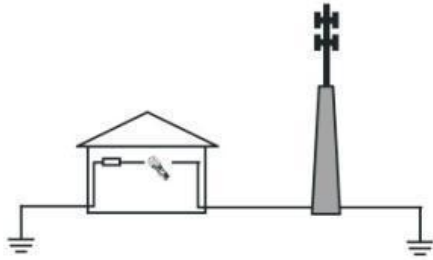
Earth resistance of loading point:  $R_C = R_2 - R_A$

Note: when measuring R1, we should make sure that no conductor link between BC and AC, which is requested for measuring R2 and R3.

### (2) Measurement of earth resistance of oiling machine



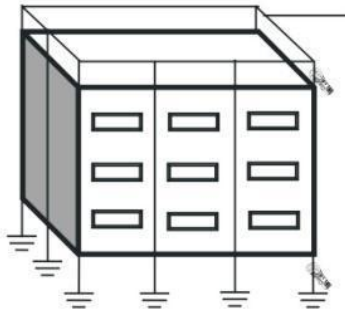
Listed as the above chart, find an earth pole which is apart from earth pole of oiling machine, such as earth pole of loading point; then, connect the two points with test line and measure out the value RT with the



If the measured value of the instrument is lower than permitted value of earth resistance, it is confirmed that earth resistance of the machinery room and transmitter tower is qualified. If reading bigger than the permission value, please apply measurement of single point grounding.

### 3. Application in thunder-prevention grounding system of buildings

If grounding electrode of building is separated from each other, earth resistance of various electrodes can be measured as the following chart.



Thunder-prevention overhead conductor

### 4. Application in grounding system in gas station

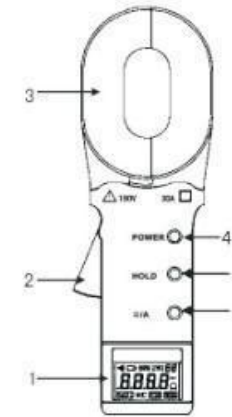
In environment full of explosive gas, such as gas station, oil field and oil groove, it is very necessary to adopt explosion-proof products. Generally, gas station is requested to ensure earth resistance and link resistance as following:

Number	Item to measure	Technical requirement
1	Earth resistance of oil tank	$\leq 10 \Omega$
2	Earth resistance of loading point	$\leq 10 \Omega$
3	Earth resistance of oiling machine	$\leq 4 \Omega$
4	Link resistance of oil hose of oiling machine	$\leq 5 \Omega$

### 5. Variations in the nominal working range

Distortion quantity	Limit of operating range	Distortion
Temperature	-10 °C to 55 °C	1.5 class of accuracy per 10 °C
Relative humidity	10%RH to 90%RH	1.5 class
Battery voltage	5.5V to 6.5V	0.25 class
Conductor position	From edge to centre	0.1 class
Clamp position	$\pm 180^\circ$	0.5 class
Proximity of magnetic mass	1mm steel plate against jaw face	0.25 class
Magnetic field 50-60Hz	400A/m	0.25 class
Electric field 50-60Hz	0-10KV/m	0.25 class

### IV. Structure of Meter



- Liquid Crystal Display (LCD)
- Trigger: to open and close the jaw
- Jaw: sized 65mm(L) x 32mm(W)
- POWER Key: Boot Up / ShutDown /memory
- HOLD Key: lock / Release/read
- $\Omega$ /A: switch of resistance and Current measurement condition

### V. Crystal Display

#### 1. LCD Screen

- Alarm: Shows when the measured value exceeds alarm value in settings.
- Low battery voltage