

SANWA

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SANWA ELECTRIC
INSTRUMENT CO., LTD.

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PDR-200DG

DIGITAL
EARTH RESISTANCE METER

INSTRUCTION MANUAL

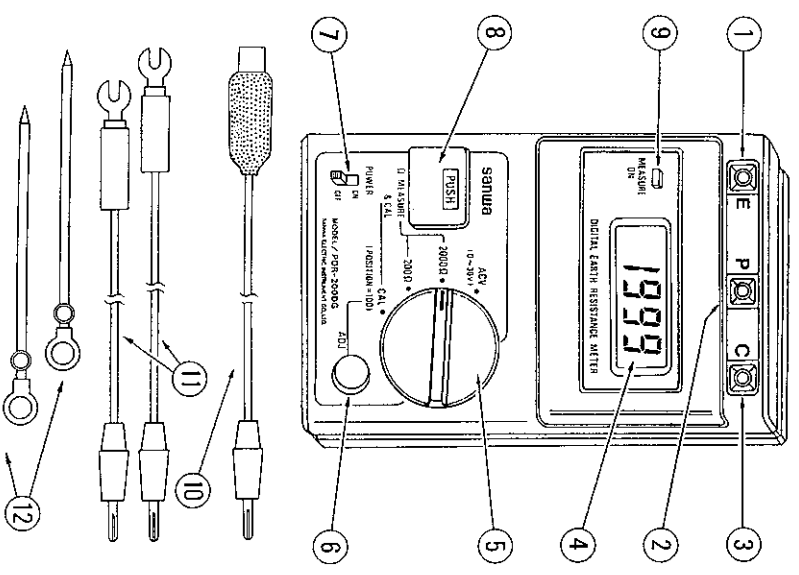
FEATURES

1. The tester is easy to use as it is a digital type, small, and light-weight.
2. Incorporates an exclusive range (0 ~ 30V) to measure earth voltage prior to measurement of earth resistance, enabling the user to prevent an indication error in earth resistance value that may be caused by leaked current to the ground.
3. Incorporates a self-calibration device, making it easy to carry out sensitivity adjustment (correction of constant current).
4. All operations such as measurement of earth resistance and calibration can be performed by simply pressing the push button switch. Besides, useless battery consumption can be avoided.
5. The user can use the tester while watching power condition all the time because it incorporates automatic battery exhaustion alarm, B mark, and LED lamp showing ON of earth resistance measuring power source.

SPECIFICATIONS

1. Earth resistance measuring range 2. range type
2000 Ω range 0 ~ 200.0 Ω Resolution 0.1 Ω
20000 Ω range 0 ~ 2000 Ω Resolution 1 Ω
2. Earth ACV measuring range
ACV range 0 ~ 30.0V Resolution 0.1V
3. Accuracy
Earth resistance measurement $\pm(3\% \text{ rdg} + 5 \text{ digit})$
Earth ACV measurement $\pm(3\% \text{ rdg} + 5 \text{ digit})$
4. Earth resistance measuring method
Constant-current system. Tripolar or bipolar
5. A-D conversion method
Integrated system Input sensitivity: 200mV f.s.
Max. display: 1999 LCD type
Overrange display: Only the most significant digit "1" is displayed.
6. Battery exhaustion check
B is displayed automatically.
7. Used temperature 0 $^{\circ}\text{C}$ ~ 40 $^{\circ}\text{C}$
8. Guaranteed accuracy temp. 10 $^{\circ}\text{C}$ ~ 30 $^{\circ}\text{C}$
9. Battery 1.5V (SUM-3) x 6 About 100 hours
continuous operation is possible.
10. Size 163 x 100 x 47 mm
11. Weight About 470 g
12. Accessories
Measuring cord: 1 each of 5m, 10m, and 20m
Ground rod: 2 pcs.
Instruction manual: 1 copy
Carrying case for the tester alone: 1 ea
Carrying case for the tester and accessories: 1 ea

APPEARANCE AND THE NAME OF PARTS



- ① E terminal (for earth connection)
- ② P terminal (for auxiliary earth connection)
- ③ C terminal (for auxiliary earth connection)
- ④ Display (LCD)
- ⑤ Range selector switch
- ⑥ Calibration knob
- ⑦ Power switch
- ⑧ Push switch
- ⑨ LED (to show ON of the push switch)
- ⑩ Earth connection cord 5m
- ⑪ Connection cords for P and C terminals: 10m, 20m
- ⑫ Auxiliary ground rod 2 pcs.

USAGE I (TO CHECK IF THE BUILT-IN BATTERIES WORK NORMALLY)

1. Set the range selector switch to CAL position and turn on the power switch.
2. Press the push switch.
3. Then, numerals or units are displayed, LED to show ON of the push switch lights, and if **[B]** mark is not displayed, the built-in batteries are normal.
4. If LED fails to light and nothing is displayed,
 - the batteries have totally worn out, or
 - they have not been inserted into the tester.
 Either of the above two cases is considered. So, remove the rear case and insert new batteries into the tester. (Six SUM-3 batteries)
5. Or, if **[B]** mark appears at the left below of the display like **[B] 1999** with LED lighting a shade dimly, the inner batteries have worn out. Immediately replace them with fresh ones.
6. When opening the rear case, remove the center fixing screw, push the top of the rear case strongly with fingers, and pull it away as in Fig. 1.

USAGE II (MEASURING EARTH RESISTANCE)

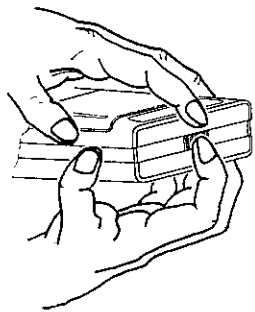
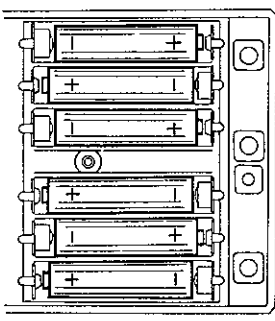


Fig. 1



Battery arrangement

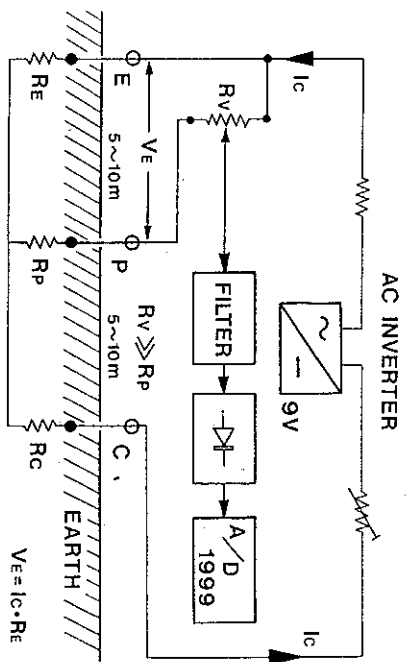


Fig. 2

EXAMPLE $I_c = 1 \text{ mA}$
 $V_e = 10 \text{ mV}$
 $R_e = \frac{V_e}{I_c} = \frac{10 \text{ mV}}{1 \text{ mA}} = 10 \Omega$

$\therefore R_e = \frac{V_e}{I_c}$

1. Establishment of auxiliary ground rods and connection with the PDR-200DG

- 1.1 As in Fig. 2 and 3, establish auxiliary ground rods, P and C, in a straight line at an interval of about 5 ~ 10m.
- 1.2 If they cannot be established in a straight line, some bend is allowable ($\angle \text{EPC} \geq 120^\circ$)
- 1.3 When using the net, R_p and R_c values become larger. The power source impedance of the meter that supplies E-C with constant AC current is so large that an error may not be produced even by some increase of re-

sistance value. However, bear it in your mind to improve contact with the ground by spraying the net with enough water when measurement has to be carried out on the place made of concrete. Measurement on the asphalted place is impossible.

1.4 When the auxiliary ground rods have been established, connect them to E, P, and C terminals with attached cords as in Fig. 3.

2. Measuring earth resistance (Tri-polar method)

2.1 Calibrating the scale (Adjusting constant-current I_c and sensitivity)

2.1.1 After the wirings have been completed as in item 1, calibrate the scale (CAL. ADJ.). This operation is aimed at adjusting errors that may be produced by variation in battery voltage or the place where R_p value differs from R_c value.

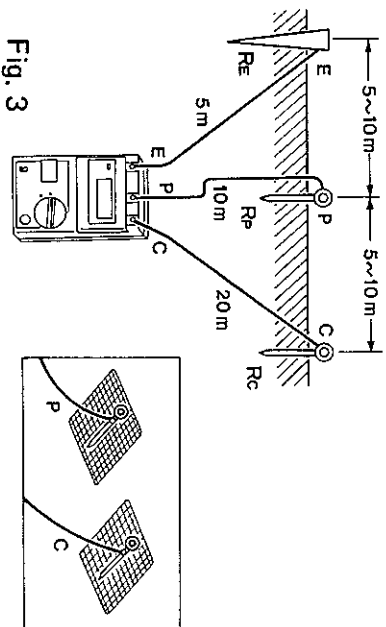


Fig. 3

2.1.2 Set the range selector switch to CAL position.

2.1.3 Press the push switch.

2.1.4 Numeral is displayed, so make it "100" by turning the calibration knob.

2.1.5 Be sure to do calibration whenever each measurement is carried out. Calibration is most necessary when changing the position of the auxiliary ground rods, P and C, for R_p and R_c values may be greatly increased by incomplete ground rod establishment.

CAUTIONS

When R_p and R_c values become beyond $10k\Omega$ each, an error in measured value is produced and even calibration becomes impossible. Insert the auxiliary ground rods, P and C, into the ground completely.

2.2 Selection of range and measurement

2.2.1 Set the range selector switch to either 200Ω or 2000Ω range according to the value of earth resistance to be measured.

2.2.2 Press the push switch, and earth resistance R_E value will be displayed.

2.2.3 When R_E value is more than 200.0 or 2000 , the most significant digit "1" alone is displayed with other digits disappearing. This means an overrange indication.

3. Measuring earth resistance (Bipolar method)

3.1 When the earth whose resistance value is already known exists near the measuring place, it is possible to measure unknown earth resistance by using the known earth earth resistance.

- 3.2 Connect the earth to be measured to E terminal with attached cord.
 - 3.3 Then, make P terminal and C terminal put together and one terminal, and connect the known earth to it with attached cord.
 - 3.4 As for the way to calibrate the scale and to perform measurement, refer to the foregoing item.
 - 3.5 The value so measured is a total value of the unknown earth resistance value plus the known earth resistance value, so deduct the known earth resistance value from the indicated value to obtain an actual value.
- 4. Measuring earth AC voltage**
- 4.1 Turn the range selector switch to ACV position after completing the wirings. It is not necessary to press the push switch in this case.
 - 4.2 If leaked AC current flows in the earth circuit, earth voltage is present and displayed.
 - 4.3 If this earth voltage is more than 5V, measurement of earth resistance may be hampered. Start measurement of earth resistance after minimizing influence of this earth voltage by disabling the circuit either to the earth or to the power source of the apparatus using earth.
 - 4.4 When measuring earth voltage alone, use E and P terminals. Connection to C terminal is not necessary.
- 5. Judgment when measurement (calibration) is impossible**
- 5.1 Exhaustion of the batteries
Replace the batteries with new ones when **B** mark appears.
 - 5.2 Cord to E, P, or C terminal is open.

5.3 How to test open cord

Carry out continuity test with a circuit tester or it is possible to carry out test by connecting P terminal to C terminal of the PDR-200DG as in Fig. 4. In this case, set the range selector switch to the 2000Ω range and press the push switch. If cord is not open, an overrange indication (only "1") is displayed. If it is open, some numeral is displayed.

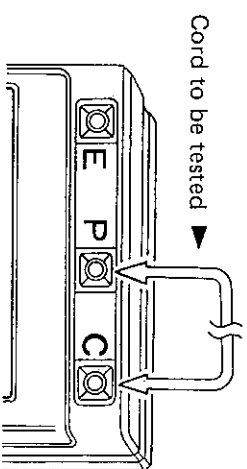


Fig. 4

GENERAL CAUTIONS

1. Be sure to set the power switch to OFF position after finishing measurement with this tester.
2. The display is protected, but never push it by force.
3. Avoid storing the tester in a high temperature and humidity or under the direct rays of the sun.
4. Remove the inner batteries from the tester if it is not used for a long time. That will protect the tester from a possible damage caused by leaked battery liquid.
5. When the housing of the tester is stained, clean it with soap water. Never use thinner, benzine, or the like.
6. Do not hesitate to ask our Export Department if you have any question.

(The specifications herein may be changed for improvement without notice.)