User's Manual

3207

Insulation Polytester

Model: 320731, 320732

YOKOGAWA

Yokogawa Meters & Instruments Corporation

IM 3207-E

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SAFETY PRECAUTIONS

■ The following safety symbols are used on the instrument and in this manual.

Danger! Handle with Care.
This symbol indicates that the operator must refer to an explanation in the User's Manual in order to avoid risk of injury or death of personnel or damage to the instrument.

■ Be sure to exercise special care in the following to avoid electrical or other dangers that may result in injury or the loss of life of personnel.

WARNING

- During measurement of ground resistance
  - A high voltage is generated on the measurement leads during the measurement of ground resistance.
  - Do not touch the ground spikes or the measurement terminal.
- Measurement lead
  - Use the lead supplied by Yokogawa for the instrument concerned.
  - Do not use a deteriorated or damaged lead.
  - Do not attach/detach the lead to/from the instrument prior to releasing it from the measured object.
- Protection
  - If the case cracks from being dropped or struck, it may fail to be properly insulated. Do not use it until it can be repaired.
- Replacement of batteries
  - Prior to detaching the cover for replacing the batteries, release the measurement lead from the measured object and do not touch the measurement switch. A high voltage may otherwise be generated.
- Operating Environment
  - Do not operate the instrument in an atmosphere where any flammable or explosive gas is present.
  - Do not use the instrument if there is condensation on it.
- Disassembly
  - Do not attempt to disassemble the instrument.

■ Be sure to follow the instructions below to avoid electrical shock or other dangers that may result in injury of personnel or damage to the instrument.

CAUTION

- Measurement
  - Do not apply a voltage over the allowable limits between the terminals.
  - Do not apply a voltage to the measurement terminal during the measurement of resistance.
- Power supply to measured object
  - Metals and wring connected to the electric equipment may have a voltage being applied.
    Confirm that no voltage are being applied prior to connecting the measurement terminal.
    The same precaution applies to the grounding system.
- Batteries
  - Do not use different types of batteries together, nor new and old batteries together. In the case that the instrument is not used for a long period, store the instrument with the batteries removed.
    The batteries may otherwise leak acid which will damage the instrument.

■ Notice Regarding This User's Manual

1. The information covered in this user's manual is subject to change without prior notice.
2. No part of this document may be reprinted or reproduced without authorization.
3. Every effort has been made to ensure accuracy in the preparation of this manual.
   Should any errors or omissions come to your attention however, please inform Yokogawa accordingly.
4. Yokogawa is by no means liable for any damage resulting from the user's mishandling of the product.

Table of Contents

1. GENERAL

The Model 3207, which is indispensable for the inspection of private electric facilities, electric appliances, and distribution lines, is a measurement instrument equipped with five functions for measuring insulation resistance, earth resistance, earthing voltage, AC voltage, and AC current, and is frequently used for maintenance.

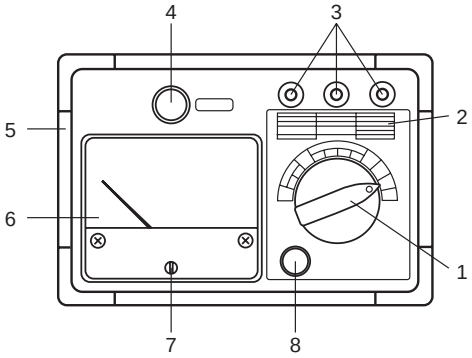
This instrument is composed of a power source, circuit, indicator, and cover. The circuit modules are mounted on the single printed circuit board. Taut-band meters and impact-resistant plastic are used for the indicator and the cover, respectively, for excellent resistance to vibration and shock. The Model 3207 has been designed with full consideration of the functions required for a handy, portable maintenance instrument.

■ Two ratings of insulation resistance:
500V/100MΩ: Model 320731
250V/ 50MΩ: Model 320732

2. FEATURE

■ Compact, lightweight, tough, and easy to operate.
■ Five measurements in one instrument
- Insulation resistance
  (Insulation resistance tester)
- Earth resistance
  (Earth resistance tester)
- Earth voltage
- AC voltage
  (AC voltmeter)
- AC current
  (AC ammeter)

3. NAMES OF PARTS



1. **Range dial**
   Selects the measuring function and set range.
2. **Terminal guide**
   Indicates where to connect the measuring lead.
3. **Measuring terminals**
   Terminals for connecting the measuring lead.
4. **Connector for probe switch**
   Connecter to use the probe with an insulation resistance measuring switch (sold separately).
5. **Carrying bag (Hard)**
   Storage case for the main body. A knapsack is available for storing accessories.
6. **Indicator**
   Indicates the measured value.
7. **Zero adjuster**
   Screw to adjust the indicator's mechanical zero position. Usually, there is no need for adjustment.
8. **Push button switch (can be locked)**
   Press this switch to start measurement.
   Hold down this switch and turn it clockwise to lock it.

4. FUNCTION

Function	Symbol	Rating	
Insulation resistance	MΩ (Black)	<1> 500V/100 MΩ <2> 250V/50 MΩ	–
Earth resistance	EΩ (Blue)	0 to 15/150/1500Ω	–
AC voltage	V (Red)	70 to 130 V /140 to 260 V /280 to 520 V	Compatible with 50 and 60 Hz
AC current	A (Black)	0 to 15/30/75/150/ 300 A (with CT)	

<1> Model: 320731
<2> Model: 320732

Other check functions:

Battery (built-in) Check: B (Blue)
Earth resistance Check: CH (Blue)
Earthing voltage Check: EV (Blue) 0 to 30 V

⚠ CAUTION

Do not change the range dial during measurement.

5. OPERATION

5.1 Battery Check (B)

(1) When insulation resistance and earth resistance are measured, battery check should be made in advance. Set the range dial to "B" and push the switch. If the indicating pointer stays within the blue belt, the built-in batteries are of use.

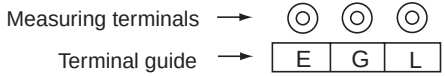
(2) If the pointer dose not reach the belt, the batteries must be replaced with new ones.
(For details, see "6. Battery Replacement".)

5.2 Insulation Resistance Measurement (MΩ)

(1) Set the range dial to "MΩ" and connect the accessory leads (black and orange) to the respective measuring terminals E (Earth) and L (Line). Then connect the leads between the probes and the object, and press the switch to read the insulation resistance directly.

(2) When using Guard, connect to "G" terminal (Central terminal).

(3) The probe switch (an accessory, sold separately) can be used as the line probe which is connected to the socket on the instrument.



5.3 Earth Resistance Measurement (EΩ)

(1) Set the range dial to “CH”, make connections as shown in Fig.1 with the accessory leads (green, yellow and red) and the auxiliary spikes (P, C). Push the switch to assure that the pointer comes into the CH blue belt. Then turn the dial to “EΩ” and push the switch again selecting a suitable range according to the earth resistance.
Connect earthing electrodes (E) and auxiliary spikes (P, C) to the main body using the accessory lead lines as shown in Fig. 1. Leave space of 5 to 10 m between E and P, and between P and C respectively. E, P and C should be approximately in a line.

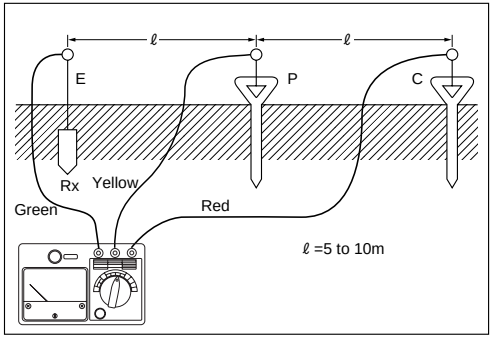


Fig.1

(2) If the pointer does not stay within the CH blue belt, auxiliary spikes should be more tightly stuck into the ground. For auxiliary earthing, there are other methods shown in Fig.2 according to the ground conditions. (To use the auxiliary net: sold separately)

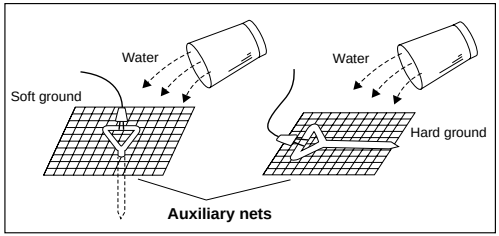


Fig.2

(3) Simplified two-electrode method

When measuring earth resistance (D), a simplified measuring method is available where there is something to serve as an almost perfect earthing like a water pipe (Plastic pipe must be avoided). (Fig. 3)

The distance between the earth (E) and water pipe must be 5 to 10 m.

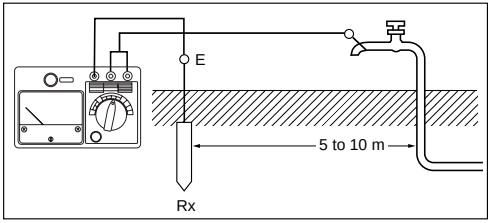


Fig.3

(4) Earthing voltage Check (EV)

Poorly insulated wiring or equipment may cause an earthing voltage (EV) due to the leakage current through the earthing resistance to be measured. If this earthing voltage is too high, it may cause an error in measurement. To detect EV, turn the dial to "EV" and if it is more than approximately 5V (▲mark on the scale), it will bring about an error in measuring the earth resistance. Therefore, the measurement should be proceeded by disconnecting the switches shown in Fig.4 and marking sure that EV is small enough. A large EV means that the wiring or loads are poorly insulated, and so the insulation resistance test must be kept within the MΩ range of this tester.

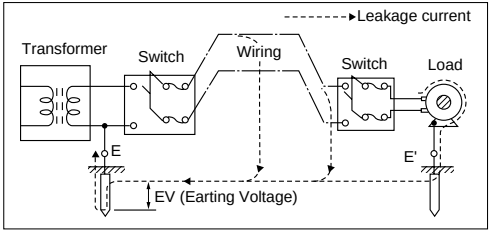


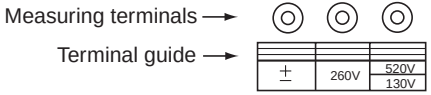
Fig.4

5.4 AC voltage Measurement (V~)

Set the dial to a suitable range of "V~", according to the voltage to be measured. Connect the accessory leads to the terminals. (The leads are used for insulation resistance measurement, too.)

"V~" has both 130 V and 520 V ranges. Upon connecting to the central terminal, both ranges are converted to 260 V.

Each range has a suppressed-zero scale whose median is respectively 100 V, 200 V, and 400 V.



5.5 AC Current Measurement ($\underset{\sim}{A}$)

Set the dial to a suitable range of "$\underset{\sim}{A}$" and connect the chips of Clip-on CT (Part No. B9103BA) with the terminal A (CT).

Clip on a current line (cable) at the center of the core as shown in Fig.5.(Errors by displacement from the center are less than ±1%)

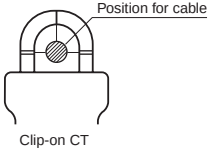


Fig.5

6. BATTERY REPLACEMENT

When the pointer stays out of the blue belt (B) during "5.1 Battery Check", the batteries should be replaced with all new ones. [R6P (SUM-3) 8 pcs.] To replace batteries, take off the covering case by loosening two screws and put new batteries in the place of consumed ones according to the polarities described on the battery holder. Do not touch the parts and wires inside when removing the covering case.

7. CAUTION

(1) Lock of the pushbutton switch
When using ranges B, MΩ, CH and EΩ, it is necessary to push the switch each time. And in case of long-time measurement the switch can be locked by merely turning it clockwise after pushing.
After measurement, unlock the switch to turn off.

(2) If it is wet around the measuring terminal (especially during insulation resistance measurement), dry off the area before use.

(3) Range check
- Always check the setting position of the range dial and the connection of terminals before starting measurement.
- Do not change the setting position of the range dial during measurement.

8. OPTIONAL ACCESSORIES

The following accessories are sold separately.

○ Part No. B9606FA : Probe switch for Insulation Resistance Measurement (Cable length: approx. 1m)
Old Part No.: B9646CE

○ Part No. B9646CG :Auxiliary nets for Earth Resistance Measurement --- 2 pcs. 30 × 30 cm

9. SPECIFICATIONS

<1> Model 320731 <2> Model 320732

Measurement	Insulation Resistance		Earth Resistance	Earth Voltage	AC Voltage	AC Current
Rating Range	<1>500V/100 MΩ	<2>250V/50 MΩ	1500Ω 0-15/150/1500Ω	0-30V	70-130V/ 140-260V/ 280-520V	0-15/30/75/ 150/300A
	(Model is to be specified)					
Method of measurement	Constant voltage converter		Constant current inverter	Rectification	Suppression (Rectification)	Clip current transformer (Rectification)
Accuracy	±5% of reading within the 1st effective measuring range ±10% of reading within the 2nd effective measuring range 0.7% or less of scale length at zero and infinity		±3% of full scale	±3% of full scale	±1.5% of full scale	±2.5% of full scale
Scale	Three-digit logarithmic (Black)		Uniform (Blue)	Uniform (Blue)	Uniform (Red)	Uniform (Black)
Remarks	Terminal voltage indicated by a central scale is more than 90% of the rated voltage.		Measuring frequency: 1.8kHz	Allowable earthing voltage: 5V	For both 50 and 60Hz	
Dimensions	Approx. 140 × 210 × 142 mm (Including bag)					
Weight	Approx. 2.3 kg (Including bag)					
Battery	R6P (SUM-3) 8 pcs.					
Accessories	Batteries : R6P (SUM-3) 8 pcs. built-in Leads for insulation resistance and AC V measurement (B9606CR) : 1 set (black and orange: 1.5m) Leads for earth resistance measurement (B9605KN) : 1 set (green, yellow and red: 5, 10, 20m) Auxiliary spikes for earth resistance measurement (B9606CD) : 2 pcs. (32cm) Clip-on current transformer (B9103BA) : lead length 2m				Accessory carrying bag (B9606CH) : Fabric knapsack Carrying bag (B9646CK) : black shoulder bag (hard) Nameplate : English names is to be specified. User's manual : 1 copy	

Effective measuring range : The range from a resistance value one-thousandth (1/1000) the maximum effective reading to the resistance value that is nearest to half (1/2) the maximum effective reading and equal to the maximum effective reading multiplied by 1, 2 or 5 or by any of these values multiplied by ten (10) raised to a whole-number power, shall be referred to as a first effective measuring range.
In addition, the range from the upper limit of the first effective measuring range to the maximum effective reading shall be referred to as second effective measuring ranges.

AC Voltage : (Caution) A suppressed-zero instrument swings in the opposite direction when measuring a voltage which is below the rating.

MEMO

MEMO

YOKOGAWA ◆

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