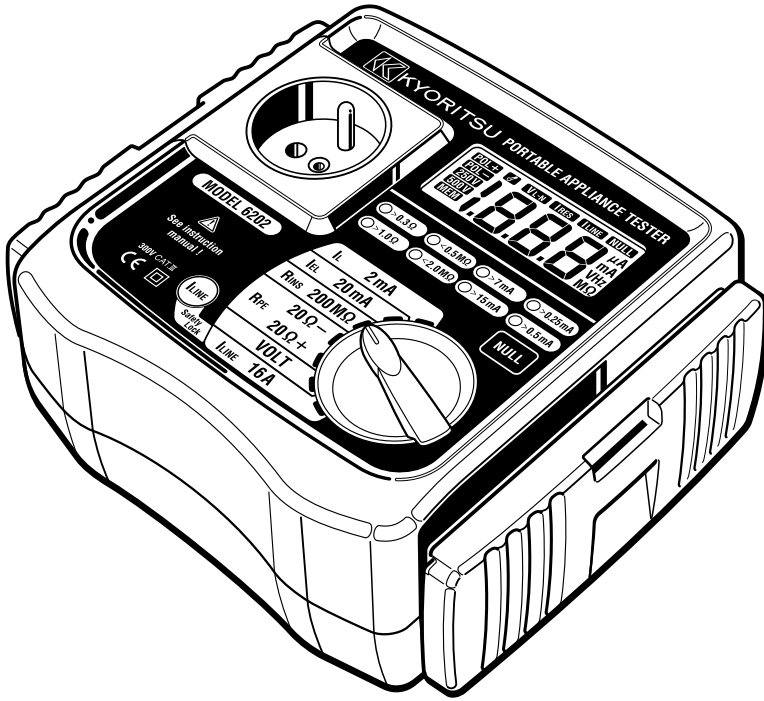


INSTRUCTION MANUAL



PORTABLE APPLIANCE TESTER

MODEL 6200 , 6202

**KYORITSU ELECTRICAL INSTRUMENTS
WORKS, LTD.**



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1. Safe testing


Electricity is dangerous and can cause injury and death. Always treat it with the greatest of respect and care. If you are not quite sure how to proceed, stop a measurement and take advice from a qualified person. This instruction manual contains warning and safety rules which must be observed by the user to ensure safe operation of the instrument and retain it in safe condition. Therefore, read through these operating instructions before using the instrument.

IMPORTANT:

1. This instrument must only be used by a competent and trained person and operated in strict accordance with the instructions. KYORITSU will not accept liability for any damage or injury caused by misuse or non-compliance with the instructions or with the safety procedures.
2. It is essential to read and to understand the safety rules contained in the instructions or with the safety procedures.
3. The symbol  indicated on the instrument means that the user must refer to the related sections in the manual for safe operation of the instrument. Be sure to carefully read instructions following each symbol  in this manual.

 **DANGER** is reserved for conditions and actions that are likely to cause serious or fatal injury.

 **WARNING** is reserved for conditions and actions that can cause serious or fatal injury.

 **CAUTION** is reserved for conditions and actions that can cause minor injury or instrument damage.

DANGER

- This instrument can be connected only to the commercial power of 230V+10%-10%, 50/60Hz.
- For safety reasons, only use the Test Leads designed to be used with this instrument and recommended by KYORITSU.
- Mains power supply to which the instrument is connected must be protected with a fuse or a breaker of 16A (max. rating) against over load.
- Use only grounded mains outlets to supply the instrument.
- Do not touch the device under test while testing is in progress. Since a high voltage of 500V is outputting continuously, especially while measuring insulation resistance, user may get electrical shock. Also not to touch the capacitor of the device under test as hazardous voltage may exist.
- When testing, always be sure to keep your fingers behind the safety barriers on the test leads.
- Not to exceed max. throughput of 4000VA on current consumption (ILINE) range of M-6202.
- Disconnect the instrument from the power supply when measurement is finished. Do not leave the instrument with connected to the power supply.

WARNING

- **Never open the instrument case** - because dangerous voltages are present. Only fully trained and competent electrical engineers should open the case.
- If abnormal conditions of any sort are noted (such as a faulty display, unexpected readings, broken case, cracked test leads, etc) do not use the instrument and return it to your distributor for inspection and repair.
- Never attempt to use the instrument if the instrument or your hand is wet.

CAUTION

- When using Test Leads with alligator clip, be sure to check the alligator clip is firmly connected to the metal part of the device under test. Otherwise, inaccurate measurement or arc at the contacts may occurs.
- The rated measuring voltage for insulation test is 500V.DC. For electrical devices to be tested, if this test voltage seems not proper to apply, contact your distributor and ask for advices.
- When testing faulty device, it may trip the circuit breaker of main power supply during test and may cause interruption of service. Be careful when the same main power supply is used for PCs.
KYORITSU is not liable for loss of data on PC during testing with this instrument.
- The device under test is powered on during most tests, but please turn it to OFF position after use.
- Use a cloth dipped in water or neutral detergent for cleaning the instrument.
Do not use abrasives or solvents.

2. Procedure of removing cover

Model 6200 and 6202 have a dedicated cover to protect against an impact from the outside and prevent the operation part, the LCD, and the connector socket from becoming dirty. The cover can be detached and put on the back side of the main body during measurement.

2.1 Method of removing the cover

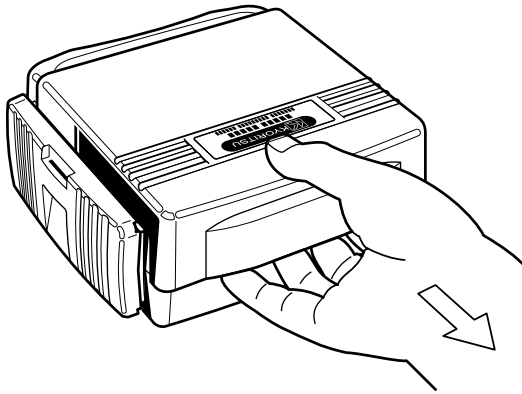


Fig.1

2.2 Method of storing the cover

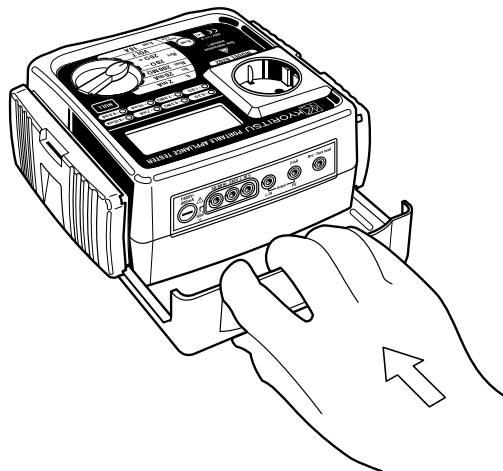


Fig.2

3. Product summary and explanation

3.1 Product summary

Model 6200, 6202 perform tests and measurements in accordance with DIN VDE 0701:2000 (Repair, modification and testing of electrical instruments) and DIN VDE 0702:1995 (Repeat tests for electrical instruments). These standards require to measure protective conductor resistance, insulation resistance and equivalent leakage current of repaired or modified equipment or to test the absence of voltage at the exposed metal parts of information technology equipment and office machine. This instrument can perform voltage measurement of main power supply, in addition to above measurements. For M-6202, it can perform current consumption measurement.

This instrument is designed to check the electrical safety of the devices of Safety Class I, Class II and Class III categories. As a guide IEC standard define these three categories as follows:

Class I : Devices which have a functional insulation throughout and an earth connected case. These are often described as earthed devices.

Class II : Devices which have both functional and additional insulation where any metal parts cannot become "Live" under fault conditions.

Class III : Devices in which protection against electrical shock rely upon supply from SELV circuit and in which hazardous voltage are not generated.

Note) SELV (safety extra low voltage) circuit is designed and protected that under normal operating conditions, single fault condition and when basic insulation is damaged, its voltage do not exceed a safe voltage.

3.2 Test range

MODEL 6200 and 6202 have following features.

	M-6200	M-6202
IL : Contact current measurement	O	O
IEL : Equivalent leakage current measurement	O	O
RINS : Insulation resistance measurement	O	O
RPE : Protective conductor resistance measurement	O	O
VOLT : Voltage measurement of mains power supply	O	O
ILINE : Current consumption measurement	×	O

3.3 Features

- Compact, light weight and truly portable
- Robust Panel and Case
- Capable of measuring the voltage of main power supply
- Large custom digital display
- Easy to perform various tests specified in DIN VDE 0701/0702, capable of judging pass/fail of tests by LED on the panel and by buzzer.

3.4 Instrument layout (Illust: M-6202)

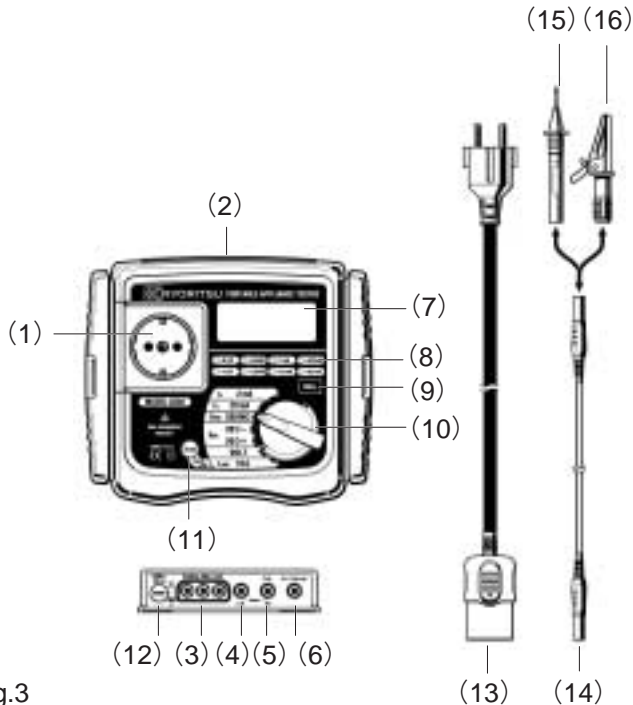


Fig.3

(1) Test socket

If the device under test (hereinafter, referred as "DUT" in this document) is equipped with a mains plug, the measurement of protective conductor resistance, insulation resistance, equivalent leakage current and contact current can be performed.

(2) Terminal block

The supplied mains plug and Test Leads can be connected to this terminal. And this terminal can be used when making a measurement with an optional cord.

- (3) Terminal block / Terminal for mains cord
The supplied mains cord can be connected to this terminal.
- (4) Terminal block / L/N terminal
This terminal wired in parallel to two short-circuited Phase terminals at the test socket (1).
The DUT Phase conductors can be connected to this L/N terminal and measured, if the DUT is not equipped with a mains plug.
- (5) Terminal block / PE/2mA terminal
Contact current at exposed conductive parts which are not connected with protective conductor can be measured by connecting RPE-Test Lead. In addition, this terminal is wired in parallel to the protective conductor terminal at the test socket (1), so the DUT protective conductor can be connected to this terminal, if the DUT earth terminal is not equipped with a mains plug. Beyond this, exposed conductive parts at the DUT must be connected to this terminal for insulation testing and the measurement of equivalent leakage current.
- (6) Terminal block / RPE-Test Lead terminal
RPE-Test Lead for resistance measurement of the protective conductor can be connected to this terminal, and the alligator clip is to be connected with the enclosure of the DUT.
- (7) LCD
Measured values are displayed.
- (8) LED for threshold value
The red LED lights up when limit values defined in the applicable standards have been exceeded during the measurement of protective conductor resistance, insulation resistance, equivalent leakage current and contact current.
- (9) NULL button
NULL setting shall be done before starting the measurement of protective conductor resistance. (Cancel the resistance of the Test Lead, inside protective fuse and so on.)
- (10) Range switch
Select a range with the range switch.

(11) Safety lock button (Only for M-6202)

To select the range for current consumption measurement, turn the range switch while this button is being pressed. It is to prevent any hazards will not occur on user by DUT operates suddenly.

(12) Protective fuse

Protected by fuse of 600V/500mA ceramic fuse (F type $\Phi 6.35\text{mm} \times 32\text{mm}$) against external over voltage.

(13) Mains cord : M-7125

This mains cord can be connected to the main power supply so that the instrument can derive power from it. To measure contact current, the socket of the mains power supply is to be equipped with an earth terminal.

(14) RPE-Test lead : M-7129

The Test Lead can be combined with either alligator clip or probe with blade type prod.

Whichever can be used as usage.

(15) Attachment - Probe with blade type prod

(16) Attachment - Alligator clip

3.5 Optional accessory

(1) Test Lead for external terminal: M-7122

It can be used for a measurement via external terminal on the instrument.



Fig.4

(2) Test Lead for measuring distribution board : M-7121

It can be used when the mains cord (13), described in clause 3.4, cannot be connected to the outlet (no earthing contact socket is available).

(Please refer to clause 5.2-3 for the connection)

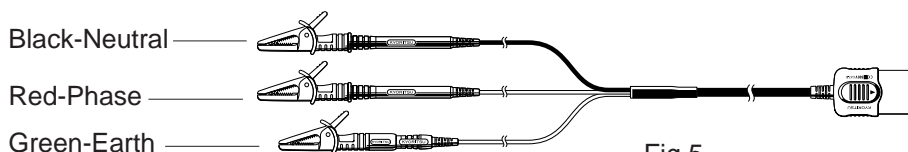


Fig.5

3.6 Explanation for indications

3.6-1 M-6200 Display (common with M-6202)

The Polarity of protective
earth conductor resistance

Current consumption

Power supply voltage
(Line-Neutral)

NULL indication

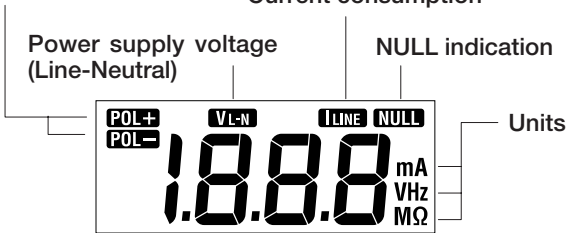


Fig.6

Note. 1) Over range display: "OL" symbol is displayed on the LCD over range display.

2) LINE = PHASE

3.6-2 LED for threshold value indication and buzzer

When exceeding following limit values which are defined in DIN VDE0702:1995, LED lights up and buzzer sounds.

Measuring range	Condition	LED for threshold value indication	Warning buzzer (continuous sound)
Protective conductor resistance	RPE >0.3 Ω	●	---
	RPE >1 Ω	●	●
Insulation resistance	RINS < 0.5M Ω	●	●
	RINS < 2.0M Ω	●	---
Equivalent leakage current	IEA >7.0mA	●	---
	IEA >15mA	●	●
Leakage current / contact current (substantiation of absence of voltage)	IL >0.25mA	●	---
	IL >0.5mA	●	●

3.7 Applicable standards

Instrument operation: DIN VDE 0701:2000 / DIN VDE 0702:1995

Safety: IEC/EN61010-1 CATIII 300V-instrument

IEC/EN61010-2-031 CATIII 300V(600V)-test lead

4. Specification

● General specification, measuring range and accuracy

Voltage (VOLT) measurement of mains power supply

Measuring range	180 ~ 260V AC
Resolution	1V
Accuracy	$\pm (2\% \text{rdg} + 3 \text{dgt})$

Measurement of Protective conductor resistance (RPE)

Rating	20 Ω + and 20 Ω - (Bi-polarity test)
Measuring range	0 ~ 19.99 Ω
Resolution	10m Ω
Open-circuit voltage	$\pm 5.0 \pm 0.4$ V DC
Measuring current	Within 200 ~ 250mA DC (when measuring 0 ~ 2 Ω)
Accuracy	$\pm (2\% \text{rdg} + 3 \text{dgt})$

Measurement of Insulation resistance (RINS)

Rating	500V / 200M Ω
Measuring range	0~19.99M Ω / 199.9M Ω (2auto ranges)
Resolution	10k Ω / 100k Ω
Output voltage at open circuit	500V DC +50% -0%
Short-circuit current	14mA DC or less
Rated current	Within 1~1.5mA DC under the load of 0.5M Ω
Accuracy	$\pm (2\% \text{rdg} + 3 \text{dgt})$

Measurement of Equivalent leakage current (IEL)

Rating	20mA AC
Measuring range	0 ~ 19.99mA AC
Resolution	10 μ A
Open-circuit voltage	30V \pm 5V AC
Short-circuit current	35mA AC or less
Accuracy	$\pm (2\% \text{rdg} + 3 \text{dgt})$
Internal resistance (RA Meter)	2k Ω

Measurement of Contact current (IL)

Rating	2mA AC
Measuring range	0 ~ 1.999mA AC
Resolution	1 μ A
Accuracy	$\pm (2\% \text{rdg} + 3 \text{dgt})$
Internal resistance (RA Meter)	2k Ω

Measurement of current consumption (ILINE) (Only for M-6202)

Rating	16A AC
Measuring range	0 ~ 15.99A AC
Resolution	10mA
Accuracy	$\pm (2\% \text{ rdg} + 3\text{dgt})$
Throughput	Max. 4000VA

Threshold and display (Threshold display is dependent on the accuracy on each measuring range.)

Range	Threshold	LED for threshold display	Warning buzzer (continuous sound)
Protective conductor resistance	RPE >0.3 Ω	●	---
	RPE >1 Ω	●	●
Insulation resistance	RINS < 0.5M Ω	●	●
	RINS < 2.0M Ω	●	---
Equivalent leakage current	IEL >7.0mA	●	---
	IEL >15mA	●	●
Contact current	IL >0.25mA	●	---
	IL >0.5mA	●	●

Reference conditions

Unless otherwise specified, this specification is dependent on following condition.

- (1) Ambient temperature : $23 \pm 5^{\circ}\text{C}$
- (2) Relative humidity : 45 ~ 75%
- (3) Position : Horizontal
- (4) AC power source : 230V, 50/60Hz
- (5) Altitude : 2000m or less

Operating temperature and humidity range

0°C ~ +40°C Relative humidity: 85% or less (no condensation)

Storage temperature and humidity range

-20°C ~ +60°C Relative humidity: 85% or less (no condensation)

Rate voltage and frequency

Rated voltage : 230V $\pm 10\%$

Rated frequency : 50 ~ 60Hz $\pm 1\%$

Operating method : Dual slope integration

Display : 3 1/2 digit in LCD, character height 17mm,
Max reading 1999 with units, symbols, etc.

Maximum rated power

Approx. 9VA

Maximum throughput of M-6202

Max. 4000VA

Outer dimension and weight

Outer dimension: 185(L) × 167(W) × 89(D)mm

Weight: Approx. 1kg (only the instrument body)

Symbols used on the instrument:

- ☐ Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION
- ⚠ Caution (Refer to the accompanying instruction manual)

5. Preparation before a measurement

5.1 Visual inspection

Before starting a measurement, user should undertake visual checks on the mains cord, case and that the correct type and rated fuse is fitted to the DUT. And also there should be no evidence of damage of a nature that may impair the electrical safety of the item.

5.2 Connection to mains power supply

5.2-1 Connection of mains cord

Set the range switch on the instrument to "VOLT" range and insert the socket of mains cord to the instrument. Then connect the plug to the outlet of mains power supply.



Fig.7

⚠ CAUTION

- Always be sure to check there is no abnormal conditions or damages on the instrument and cords. If any evidence of abnormality found, measurement shall be stopped immediately.
- The outlet of mains power supply must have earth terminal.
- This instrument can be only connected to the commercial power of 230V+10%-10%, 50/60Hz.

5.2-2 Check the mains power supply voltage

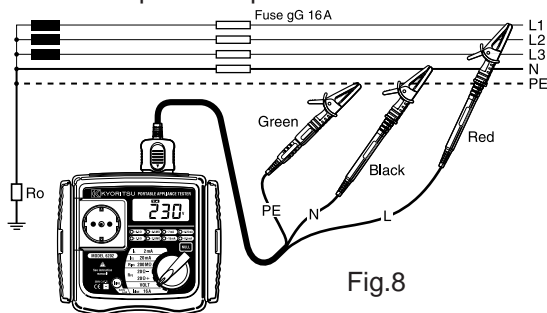
There is no power switch and the instrument is immediately ready for use. Mains power supply voltage is displayed on the LCD. Please check the value, and when it is from 207V to 253V, the instrument can perform correct measurements. If the displayed value is out of above range, do not make a measurement.

⚠ WARNING

- When the voltage of mains power supply is 260V or more, "HI-V" is displayed on the LCD and buzzer sounds (discontinuous sounds). In that case, disconnect the mains cord of the instrument from mains power supply.

5.2-3 How to use M-7121(Optional cord)

If the mains cord M-7125 is not available, or no earthing contact socket is available, connection of the mains power supply and the instrument can be accomplished with the help of the optional cord.



⚠ WARNING

- The mains power supply to which the instrument to be connected shall be protected against overload with fuse or circuit breaker. The rating of the fuse and breaker shall not exceed 16A.
- Be careful not to get an electrical shock when connecting cords. This instrument can be only connected to the commercial power supply when the voltage between Neutral (N) and Phase (L1~L3) is 230V+10%-10%, 50/60Hz.

⚠ CAUTION

- The rated current capacity of this instrument, when using the optional cord, is 10A or less.
M-7121 Phase and Neutral probe have a fuse of 600V/10A (Fast acting type ceramic fuse) for safety purpose.

5.2-4 NULL setting (Protective conductor resistance range)

According to below figure, set the range switch to the range for protective conductor resistance (either $20\Omega+$ or $20\Omega-$ is OK). Press NULL button after short-circuited PE/2mA and RPE -Test lead terminals with RPE-Test Lead. Make sure that the " **NULL** " mark appears on the LCD and indicated value is "0.00 Ω " ; Data is corrected.

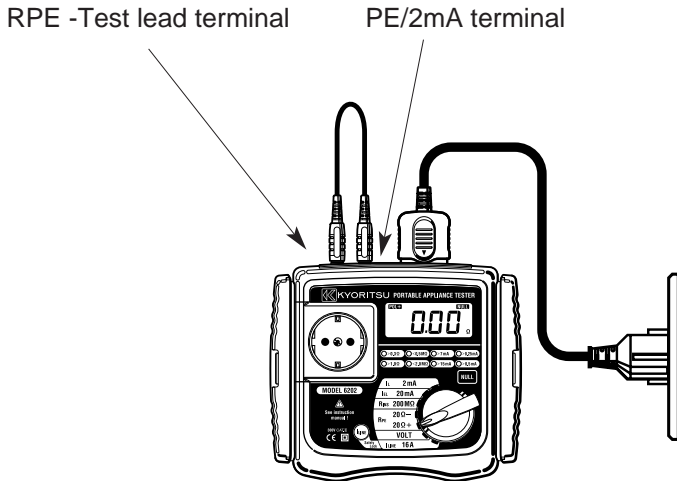


Fig.9

CAUTION

- When pressing NULL button, the indicated value is stored as a reference value. After that, the difference between the reference value (stored value) and measuring value is indicated on the LCD.
- The " **NULL** " mark is displayed on the LCD while the NULL function is operating. Each time pressing NULL button, NULL function shall be turned on and off.
- NULL function can not be released by changing the range while it is operating. To release the function, power off the instrument.
- NULL function works on both $20\Omega+$ range and $20\Omega-$ range, therefore, there is no need to do NULL setting at both ranges.
- For the measuring method shown in the following clause 6.3 and 6.4, NULL setting is required also for an optional cord.

7. Measuring method

7.1 Measuring protective conductor resistance (RPE)

The measurement of protective conductor resistance is of course not possible for devices which are not equipped with a protective conductor (e.g. Safety Class II and III devices).The objective of this test is to ensure the connection between the earth or the protective conductor of the commercial power earth pin and the metal casing and accessible conductive parts of the DUT is satisfactory and of a low enough resistance value to satisfy safety standards. And this measurement should be done also by reversing the output polarity.

- (1) Connect the DUT as described in clause 6.
- (2) Set the range switch to the "RPE 20 Ω+" position.
- (3) Read the measured value in "Ω" from the LCD.
- (4) Set the range switch to the "RPE 20 Ω-" position.
- (5) Move the cable from the DUT during a measurement, section by section over its entire length, in order to locate interruptions.



Fig.14

Results

Protective conductor resistance may not exceed the following values.
Maximum allowable protective conductor resistance values depending on cable length

Length to (m)	5	12.5	20	27.5	35	42.5	50	More than 50m
Max. resistance (Ω)	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0

Under no circumstances may a value of 1 Ω be exceeded. The table is also valid for cable reels and extension cables.

⚠ CAUTION

- Follow the procedure described in 5.2-4 and do NULL setting before a measurement.
- Alligator clip must make good contact with the enclosure of the DUT.
- When the terminal is open or the resistance value exceeds measuring range, "OL" mark (over range display) appears on the LCD.

7.2 Measuring insulation resistance (RINS)

This measurement may only be performed if the DUT has successfully completed protective conductor resistance testing (Safety class I device). The objective of this test is to ensure that the insulation between Phase or Neutral conductor of the mains power supply and the metal casing and accessible conductive parts of the DUT is satisfactory.

- (1) Connect the DUT as described in clause 6. If it is a Class II or III device, connect the PE/2mA terminal and exposed metal parts with Test Lead.
- (2) Switch the DUT on.
- (3) Set the range switch to "RINS 200MΩ" position.
- (4) Read the measured value in "MΩ" from the LCD.



Fig.15

Results

Insulation resistance may not fall short of below values.

Safety class	I	I (with heating elements)	II	III
VDE0701	1M	0.3MΩ	2MΩ	1000 Ω/V or 250kΩ
VDE0702	0.5MΩ		2M	

This instrument has LED indications which illuminate when the resulting measurement is below the DUT threshold value of 0.5MΩ or 2.0MΩ. (according to DIN VDE 0702)

⚠ CAUTION

- When the terminal is open or the resistance value exceeds measuring range, "OL" mark (over range display) appears on the LCD.
- Depending on the type of DUT, insulation resistance value is unstable and the indication may not become stable. In that case, regard the measured value as a reference value.
- Do not touch the DUT while testing is in progress. Since a high voltage of 500V is outputting continuously, user may get electrical shock.

7.3 Measuring equivalent leakage current (IEL)

The objective of this test is to ensure that leakage current between Phase or Neutral and the earth connector of the mains power supply is satisfactory and low enough to satisfy the relevant standard.

- (1) Connection is the same as shown for the measurement of insulation resistance.
(see clause 7.2)
- (2) Set the range switch to the "IEL 20mA" position.
- (3) Switch the DUT on.
- (4) Read the measured value in "mA" from the LCD.



Fig.16

Result

Equivalent leakage current may not fall short of below values.

Safety class	I	I (with heating elements)	II
VDE0701	3.5mA	1mA/kW	0.5mA
VDE0702/200	1mA	—	1mA
VDE0702	7mA	15mA(with heating power: 6kW or more)	—

According to DIN VDE 0702, the measured current value between the components to which voltage is applied during operation and exposed metal parts may not exceed 7mA, or 15mA for devices with heating power of greater than or equal to 6kW.

This instrument has LED indications which illuminate when the resulting measurement is below the DUT threshold value of 7.0mA or 15.0mA. (according to DIN VDE 0702)

⚠ CAUTION

- This instrument performs a "substitute leakage" test by applying a safe test voltage of AC30V between Phase or Neutral and the earth connector of the DUT. The results are displayed as though the DUT would be powered from a supply voltage of 230V. The resultant measurement is to be accepted as advisory and not as an absolute measurement.
- Devices that are fitted with a differential mains filter will display the value which is greater than the actual value.

7.4 Measuring contact current (IL)

Before performing this measurement, the protective conductor resistance test, in clause 7.1, must be first performed and passed. Contact current measurement to be performed instead of insulation resistance measurement for Safety class II devices, or for Safety class I devices with exposed conductive parts which are not connected to the protective conductor. (see Fig.17)

- (1) Connect the DUT to the mains outlet. Be sure to connect the same mains outlet to which the instrument is connected.
- (2) Set the range switch to the "IL 2mA" position.
- (3) Connect the RPE - Test lead with probe to PE/2mA terminal.
- (4) Power the DUT on.
- (5) Contact exposed metal parts at the DUT with the test probe.
- (6) Read the measured value in "mA" from the LCD.

Result

For Safety Class I, I(with heating elements), and II devices, according to DIN VDE 0701, Part240, measured values may not exceed 0.25mA, and may not exceed 0.5mA according to DIN VDE 0701 as well.

This instrument has LED indications which illuminate when the resulting measurement is below the DUT threshold value of 0.25mA or 0.5mA.

⚠ CAUTION

- The mains outlets to which the test instrument and the DUT are connected must be connected to the same mains outlets.
- Contact current measurement must be performed with the mains plug poled in both directions. The larger of the two measured values applies.
- A defect in the DUT may cause tripping of the residual current circuit breaker during testing, which would also result in interruption of supply power. Data must be backed up before making measurements at data processing equipment.

Connection for contact current measurement

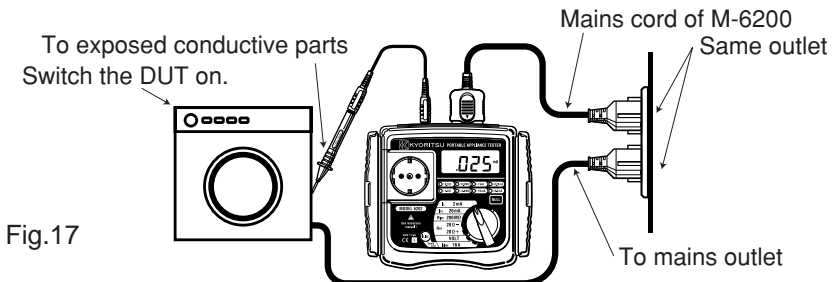


Fig.17

7.5 Measuring current consumption (ILINE) (Only for M-6202)

This instrument can measure current consumption of the DUT. The safety tests described in clause 7.4 and earlier must not be performed and passed.

- (1) Connect the DUT to the test socket on the instrument.
- (2) Set the range switch to ILINE16A range with pressing the safety lock button on the instrument. If the safety lock button is not pressed, "no" is displayed on the LCD and current measurement cannot be performed.
- (3) Power the DUT on.
- (4) Read the measured value in "A" from the LCD.

Connection for current consumption measurement

Set the range switch to ILINE16A range and power the DUT on.

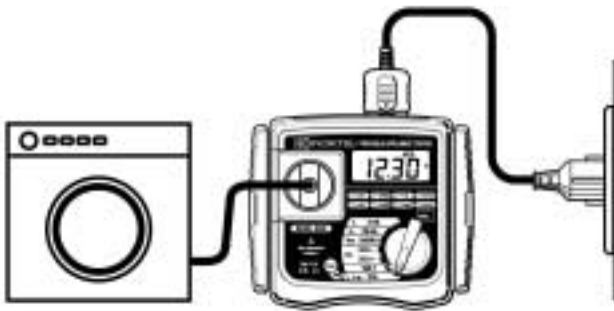


Fig.18

⚠ WARNING

- The maximum allowable load capacity is 16A. The main power supply to which the test instrument is connected must be protected against overload with a fuse or breaker. The ratings of fuse or circuit breaker shall not exceed 16A.
- Great attention must be paid when powering on the equipment such as power motor.
- The maximum throughput on current consumption measuring range (ILINE16A) of M-6202 is 4000VA. It shall not be exceeded.

8. Fuse replacement

When the protective fuse blows during use, please replace with new one according to below procedure.

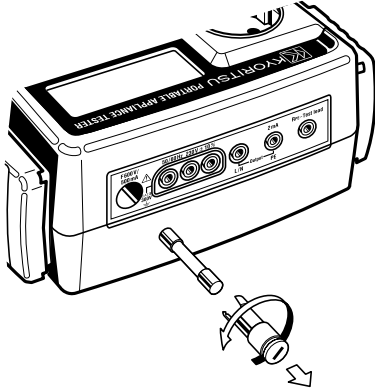


Fig.19

- (1) Use a flat head screwdriver and turn it about 45° to left and remove the fuse cap and fuse.
- (2) Remove the fuse from the fuse cap and replace it with new one.
- (3) Install the fuse cap and fuse again. At that point, the screwdriver groove shall be at about 45° turned to left from the initial position. Use the flathead screwdriver and turn it to right.

(The screwdriver groove will stop at the horizontal position.)

⚠ WARNING

- Be sure to remove mains cord from the instrument before replacing fuse.
- The fuse that user can replace is this fuse only. Never attempt to perform the other repairing.

⚠ CAUTION

- Please use the specified fuse (Fast acting type ceramic fuse : 600V/500mA - $\Phi 6.35 \times 32\text{mm}$).
For the specified fuse, purchase it by yourself or order it from our agency.

9. Services

If this instrument should fail to operate correctly, return it to your distributor. Please remember to give all the information possible concerning the nature of the fault, as this will mean that the instrument will be serviced and returned to you more quickly.

10. Case and strap assembly

Strap belt and probe case can be attached to the instrument as below.

- 1) Pass the strap belt down through the side panel of the main body from the top, and up through the slots of the probe form the bottom. (Fig. 20)
- 2) Pass the strap through the buckle, adjust the strap for length and secure. (Fig. 21)

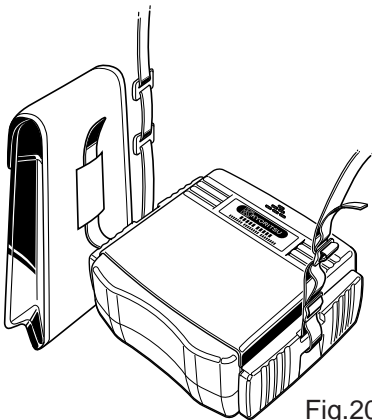


Fig.20

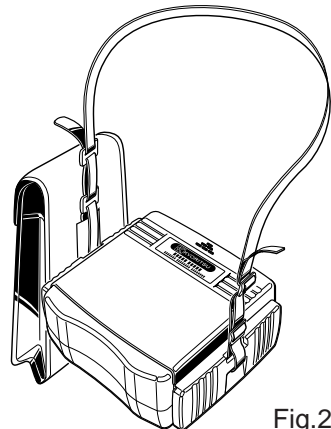


Fig.21

DISTRIBUTOR

Kyoritsu reserves the rights to change specifications or designs described in this manual without notice and without obligations.



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