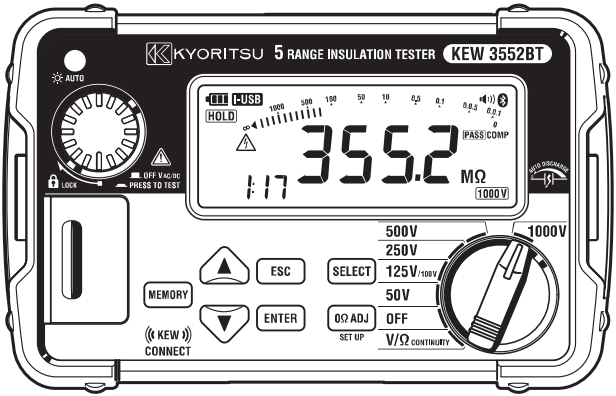
Instruction manual

JIS approved product
KEW 3552/3552BT



INSULATION - CONTINUITY TESTER

KEW 3551/3552/3552BT

KYORITSU ELECTRICAL
INSTRUMENTS WORKS, LTD.

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1. Safety warnings (Safety precautions)

This instrument has been designed, manufactured and tested according to IEC 61010: Safety requirements for electrical equipment for measurement, and delivered in the best condition after passing quality control tests. This instruction manual contains warnings and safety rules which must be observed by the user to ensure safe operation of the instrument and to maintain it in safe condition. Therefore, read through these operating instructions before starting to use the instrument.

⚠ DANGER

- Read through and understand instructions contained in this manual before starting to use the instrument.
- Keep the manual at hand to enable quick reference whenever necessary.
- The instrument is to be used only in its intended applications.
- Understand and follow all the safety instructions contained in the manual. It is essential that the above instructions are adhered to. Failure to follow the above instructions may cause injury, instrument damage and/or damage to equipment under test. Kyoritsu is by no means liable for any damage resulting from the instrument in contradiction to these cautionary notes.

The symbol ⚠ indicated on the instrument means that the user must refer to the related parts in the manual for safe operation of the instrument. It is essential to read the instructions wherever the symbol ⚠ appears in the 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 injury or instrument damage.

⚠ DANGER

- Do not apply voltages above 600 V, including voltage to earth, across the terminals of this instrument.
- KEW 3551/3552/3552BT are rated to CAT IV 300 V/ CAT III 600 V. Do not make measurements under the circumstances exceeding the designed measurement categories.
- Do not attempt to make measurements in the presence of flammable gasses; otherwise, the use of the instrument may cause sparking, which can lead to an explosion.

- Never attempt to use the instrument if its surface or your hand is wet.
- Be careful not to short-circuit a power line with the metal part of the test lead during a measurement. It may cause personal injury.
- Never open the battery compartment cover during a measurement.
- The instrument should be used only in its intended applications or conditions; otherwise, safety functions equipped with the instrument don't work, and instrument damage or serious personal injury may be caused.
- Verify proper operation on a known source before use or take actions as a result of the indication of the instrument.

⚠ WARNING

- Do not use the instrument or test leads if any abnormal conditions, such as broken cover or exposed metal parts are noted.
- First, firmly connect the test leads to the instrument, and then press the test button.
- Never install substitute parts or make any modifications to the instrument. Send the instrument to your local KYORITSU distributor for repair or re-calibration.
- Do not try to replace batteries if the surface of the instrument is wet.
- Connect each test lead firmly into the corresponding terminals.
- Stop using the test lead if the outer jacket is damaged and the inner metal or color jacket is exposed.
- Ensure that the function switch is set to OFF position before opening the battery compartment cover for battery replacement.
- Never turn the function switch while the test leads are connected to the equipment under test.

⚠ CAUTION

- Always make sure to set the function switch to the appropriate position before making a measurement.
- Power off the instrument after use. Remove batteries if the instrument is to be stored and won't be used for a long period.
- Do not expose the instrument to direct sunlight, high temperature, humidity or dew.
- Use a slightly damp cloth with neutral detergent or water for cleaning. Do not use abrasives or solvents.
- This instrument isn't water-proof. Do not let the instrument get wet. Otherwise, it may cause malfunction.
- If the instrument is wet, make sure to let it dry before putting it into storage.
- Keep your hand and fingers behind the barrier during a measurement.

Symbols

The following symbols are used and marked on the instrument and in this instruction manual. Please carefully check before starting to use the instrument.

	Double or reinforced insulation
	User must refer to the explanations in the instruction manual.
	Earth
	Danger of possible electrical shock
	Do not use on AC electric systems exceeding 660 V.
	Complies with WEEE Directive (2002/ 96/ EC) marking requirements. (valid in each EU country)

Measurement Category

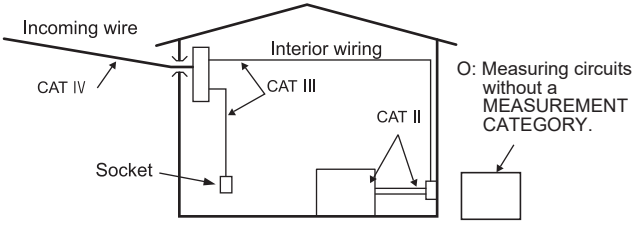
To ensure safe operation of measuring instruments, IEC 61010 establishes safety standards for various electrical environments, categorized as 0 to CAT IV, and called measurement categories. Higher-numbered categories correspond to electrical environments with greater momentary energy, so a measuring instrument designed for CAT III environments can endure greater momentary energy than one designed for CAT II.

0 : Measuring circuits without a MEASUREMENT CATEGORY.

CAT II : Electrical circuits of equipment connected to an AC electrical outlet by a power cord.

CAT III : Primary electrical circuits of the equipment connected directly to the distribution panel, and feeders from the distribution panel to outlets.

CAT IV : The circuit from the service drop to the service entrance, and to the power meter and primary overcurrent protection device (distribution panel).



2. Features

KEW 3551/3552/3552BT can measure insulation resistance, low resistance, and also AC/ DC voltage.

- LCD backlight and LED spot light to facilitate working at dimly illuminated location or at nighttime work. The built-in illuminance sensor automatically turns on/ off the lights.
- Memory function (available on KEW 3552/ 3552BT)
  Internal memory to save, recall, and delete the measured data.
- Infrared transmission function (available on KEW 3552/ 3552BT)
  Transmits the data saved in the internal memory to PC.
- Bluetooth communication function (available on KEW 3552BT)
  Connects the instrument and a Bluetooth device, like a tablet, for remote monitoring and data saving.
- Clock (available on KEW 3552/ 3552BT)
  Measured data is saved with the measurement time information.
- Auto power off function
  Automatically powers off the instrument if there is no function change or button press for ten min.
- Voltage measurement with AC/ DC auto-detection
- Insulation resistance measurement
  - Quick response
    Shows the measured result in approx. 0.5 sec.
  - With auto-discharge function
    Automatically discharges electric charges stored in the capacitive circuit when a measurement is finished.
  - With insulation status indicator
    LCD backlight color indicates whether a measured value is less than or

higher than the reference value.

- With elapsed time display
  Starts counting and displaying testing duration, elapsed time, on the start of insulation resistance measurement.
- DAR/ PI measurement function (available on KEW 3552/ 3552BT)
  Automatically calculates and displays DAR (Dielectric Absorption Ratio) and PI (Polarization Index) values during an insulation resistance measurement.

● Zero-ohm adjustment function

For low-resistance measurements, short-circuit the tips of test leads and press the 0ΩADJ button to cancel the resistance of the test leads itself.

Overview of available function list

Function		KEW 3551	KEW 3552	KEW 3552BT
Voltage measurement		O	O	O
Insulation Meas.	20G/40GΩ Range	---	O	O
	Insulation status indicator	Fixed Pass/ Fail criteria	User selectable Pass/ Fail criteria	
	DAR/ PI	---	O	O
Low-resistance Meas.	Zero ADJ.	O	O	O
	Continuity buzzer	O	O	O
Backlight		O	O	O
Memory		---	O	O
Clock		---	O	O
Data Communication	IR (MODEL8212USB)	---	O	O
	Wireless (via Bluetooth)	---	---	O

3. Specifications

● Measuring range and accuracy (at 23℃±5℃, 85%RH or less)

1. Voltage measurement

Range	300.0/ 600 V (auto-ranging)
Display range	AC 300.0 V : 0.0 to 314.9 V 600.0 V : 270 to 629 V DC 300.0 V : ± 0.0 to ± 314.9 V 600 V : ± 270 to 849 V
Measuring range (accuracy guaranteed)	AC: 2.0 to 600 V rms (45 – 65 Hz) DC: ± 2.0 to ± 600 V
Over-range display	AC: > 629 V DC (+) : > 849 V DC (-) : < - 849 V
Accuracy	±1%rdg±4dgt

* RMS detection in AC mode. For non-sinusoidal waveforms with CF<2.5, add ±1%rdg for the above listed accuracy. (850 Vpeak or less). AC/ DC auto-detection (2 V or higher)

2. Low resistance measurement (Continuity check)

Resistance range	40.00/ 400.0/ 4000 Ω (auto-ranging)	
Open-circuit V (DC)	5 V (4 - 6.9 V)	
Measurement current	200 mA or more (2 Ω or less)	
Display range	40.00 Ω : 0.00 - 41.99 Ω 400.0 Ω : 36.0 - 419.9 Ω 4000 Ω : 360 - 4199 Ω	
Over-range display	> 4199 Ω	
Measuring range and accuracy	0.20 - 4000 Ω (to keep operating uncertainty)	0 - 0.19 Ω
	±2.5%rdg±8dgt	±8dgt

3. Insulation resistance measurement

<table>
<tr><td colspan="2">Rated V</td><td>50 V</td><td>100 V</td><td>125 V</td><td>250 V</td><td>500 V</td><td>1000 V</td></tr>
<tr><td colspan="2">Range (auto-ranging)</td><td>4/40/100 MΩ</td><td>4/40/200 MΩ</td><td>4/40/250 MΩ</td><td>4/40/400 /500 MΩ</td><td>4/40/400/2000 MΩ/20 GΩ*1 (20GΩ Range: 3552/3552BT only)</td><td>4/40/400/4000 MΩ/40 GΩ*1 (40 GΩ Range: 3552/3552BT only)</td></tr>
<tr><td colspan="2" rowspan="4">Display range</td><td colspan="6">4 MΩ: 0.000 - 4.199 MΩ/ 40 MΩ: 3.60 - 41.99 MΩ</td></tr>
<tr><td colspan="6">400 MΩ: 36.0 - 419.9 MΩ</td></tr>
<tr><td rowspan="2">100 MΩ: 36.0 – 104.9 MΩ</td><td rowspan="2">200 MΩ: 36.0 – 209.9 MΩ</td><td rowspan="2">250 MΩ: 36.0 – 262.4 MΩ</td><td rowspan="2">500 MΩ: 360 - 524 MΩ</td><td>2000 MΩ: 360 - 2099 MΩ</td><td>4000 MΩ: 360 - 4199 MΩ</td></tr>
<tr><td>20 GΩ: 1.80 - 20.99 GΩ</td><td>40 GΩ: 3.60 - 41.99 GΩ</td></tr>
<tr><td colspan="2" rowspan="4">Over-range display</td><td rowspan="4">>104.9 MΩ</td><td rowspan="4">>209.9 MΩ</td><td rowspan="4">>262.4 MΩ</td><td rowspan="4">>524 MΩ</td><td colspan="2">KEW3551</td></tr>
<tr><td>>2099 MΩ</td><td>>4199 MΩ</td></tr>
<tr><td colspan="2">KEW3552/3552BT*1
While 20/ 40GΩ Range is enabled: (if disabled, the display is the same as KEW3551)</td></tr>
<tr><td>>20.99 GΩ</td><td>>41.99 GΩ</td></tr>
<tr><td colspan="2">Open-circuit V</td><td colspan="6">100 - 110 % of rated measurement voltage</td></tr>
<tr><td colspan="2">Short-circuit A</td><td colspan="6">within 1.5 mA</td></tr>
<tr><td colspan="2" rowspan="2">Rated current</td><td colspan="6">1.0 - 1.1 mA</td></tr>
<tr><td>@0.05 MΩ</td><td>@0.1 MΩ</td><td>@0.125 MΩ</td><td>@0.25 MΩ</td><td>@0.5 MΩ</td><td>@1 MΩ</td></tr>
<tr><td rowspan="4">Accuracy (tolerance)</td><td>1st effective meas. range</td><td>0.100 - 10.00 MΩ</td><td>0.100 – 20.00 MΩ</td><td>0.100 – 25.00 MΩ</td><td>0.100 - 50.0 MΩ</td><td>0.100 - 500 MΩ</td><td>0.100 -1000 MΩ</td></tr>
<tr><td>2nd effective meas. range</td><td>10.01 - 100.0 MΩ</td><td>20.01 -200.0 MΩ</td><td>25.01 - 250.0 MΩ</td><td>50.1 -500 MΩ</td><td>501 – 2000 MΩ</td><td>1001 - 4000 MΩ</td></tr>
<tr><td>The other ranges</td><td colspan="5">±2%rdg±2dgt
±5%rdg
0.050 - 0.099 MΩ: ±2%±4dgt
0.000 - 0.049 MΩ: ±2%rdg±6dgt
-----</td><td>2.00 - 20.00 GΩ</td><td>4.00 - 40.00 GΩ</td></tr>
<tr><td colspan="6"></td><td colspan="2">±5%rdg±0.4% per GΩ</td></tr>
</table>

Max. capacitive load: 1 uF: max. discharge value within a defined time (10 sec.) after a test. (IEC61010-2-034)

Measurement capacitive load: 2 uF, capacitive load which falls within the variations (±10%) at capacitive load measurement test specified in IEC 61557-2.

*1 Voltage measurements on 20 GΩ and 40 GΩ ranges can be turned on/ off. Please see *8-4 20G/ 40GΩ range* in this manual.

- Applicable standards
  - IEC 61010-1, -2-034 CAT IV 300 V/ CAT III 600 V Pollution degree 2
  - IEC 61557-1, -2, -4, -10
  - IEC 61326-1, 2-2 (EMC)
  - IEC 60529 (IP40)
  - IEC 63000 (RoHS)
  - JIS C 1302
    * KEW 3552/3552BT complies with JIS C 1302.
  - IEC 61010-031

    MODEL7260 CAT III 600 V (w/ cap)
    CAT II 1000 V (w/o cap)
    CAT II 1000 V (w/ 8017A)

    (Attach the supplied protective cap to use this test leads in CAT III or higher environments.)

    MODEL7261A CAT III 600 V (w/ alligator clip)
    CAT II 600 V (w/ flat test bar)

    (Attach the supplied alligator clip to use this test leads in CAT III or higher environments.)

    * When test leads, sometimes with metal tips, are connected and used with the instrument, the measurement category and voltage rating of the lowest rated item is applied.
- Location for use: Altitude 2000 m or less, in-door use
- Nominal system V: 600 V
  * Nominal voltage of distribution systems for which the instrument is designed. (IEC 61557)
- Operating temp. & humidity range: -10℃ to +50℃, 80 % or less (no condensation)
- Storage temp. & humidity range: -20℃ to +60℃, 75 % or less (no condensation)
- Communication (KEW 3552BT only): Bluetooth Ver. 5.0
- Withstand voltage: 5160 V AC (50/ 60 Hz)/ 5 sec.
  Between electrical circuit and enclosure
- Insulation resistance: 50 MΩ or more/ 1000 V DC
  Between electrical circuit and enclosure
- Auto-power-off: The instrument turns off automatically, after a beep sound, if there is no function or range change, or button press for about 10 min.
- LCD backlight/ LED light: Automarically turns off if there is no activity for about two min. (*disabled during a measurement.)
- Dimension: 97 (L) x 156 (W) x 46 (H) mm
- Weight: Approx. 490 g (including batteries)
- Power source: Four size AA batteries
  * Use of alkaline battery is recommended.

● Operating uncertainty

Operating uncertainty (B) is an error obtained under the nominal operating conditions and calculated with the intrinsic uncertainty (A), which is an error of the instrument used, and the error (En) due to variations. According to the standard, IEC 61557, the maximum operating error should be within ±30 %. Intrinsic uncertainty (A) is uncertainty of the performance characteristics of the instrument in the reference condition.

1. Operating uncertainty of insulation resistance measurement (IEC 61557-2)

* Formula: $B = \pm(|A| + 1.15 \times \sqrt{E_1^2 + E_2^2 + E_3^2})$

A	Intrinsic uncertainty
E_1	Influence of position (N/A for digital testers)
E_2	Influence of supply voltage (until battery status indicator becomes empty "▭" .)
E_3	Influence of temperature (0℃ - 35℃)

The specs. of this instrument are as follows.

Intrinsic uncertainty (A)..... within ±5 % of indicated value
(coverage factor: k=2)

Influence of supply voltage (E_2).... within ±5 % of indicated value

Influence of temperature (E_3)..... within ±5 % of indicated value

Max. operating uncertainty (B)..... 14 %

* The measuring range to keep the max. operating uncertainty is the same as the 1st effective measuring range.

2. Operating uncertainty of low-resistance measurement (IEC61557-4)

* Formula: $B = \pm(|A| + 1.15 \times \sqrt{E_1^2 + E_2^2 + E_3^2})$

A	Intrinsic uncertainty
E_1	Influence of position (N/A for digital testers)
E_2	Influence of supply voltage (until battery status indicator becomes empty "▭" .)
E_3	Influence of temperature (0℃ - 35℃)

* Measuring range to keep the max. operating uncertainty (within ±30%) is 0.2 to 4000 Ω.

● Possible number of measurements where battery voltage is within the effective range. (measurement of 5 sec., pause of 25 sec.)

Measurement function		Test resistor	Possible number of measurements
Insulation Resistance	50 V	0.050 MΩ	2000 times or more
	100 V	0.100 MΩ	1600 times or more
	125 V	0.125 MΩ	1600 times or more
	250 V	0.25 MΩ	1300 times or more
	500 V	0.5 MΩ	1300 times or more
	1000 V	1 MΩ	700 times or more
Low resistance		1 Ω	1400 times or more

* where:
using alkaline batteries, disabling the backlight, and disabling insulation status indicator.

4. Instrument layout

1. Front panel

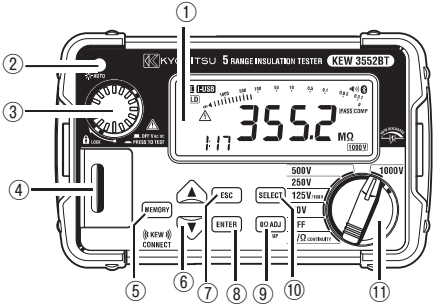


Fig.4-1

	Name	Description
①	LCD	LCD with backlight
②	Illuminance sensor	Detects ambient brightness and automatically turns on/ off the lights.
③	Test button	Starts/ stops measurement. For continuous measurement, press and turn the button clockwise to lock it in the operating position.
④	Optical adapter	To connect MODEL8212USB and transmit data to a PC.
⑤	MEMORY button	A short press (< 1 sec.) to save the measured value while the value is being held and displayed. A long press (≥ 1 sec.) to read-out or delete the saved data while the instrument is in stand-by mode.
⑥	Cursors	Alters, increases/ decreases, the user selectable values.
⑦	ESC button	Returns to the previous screen or closes the setting screen.
⑧	ENTER button	Confirms a selection.
⑨	0ΩADJ button (KEW3551: COMP button KEW3552/ 3552BT: SETUP button)	Turns on/ off the 0Ω ADJ function at low resistance measurement. * For KEW 3551: also used to turn on/ off insulation status indicator. * For KEW 3552/ 3552BT: also used to make settings of each function.
⑩	SELECT button	A long press (≥ 1 sec.) while measuring 125 V switches a measurement range to 100 V range; a short press (<1 sec.) at voltage measurement switches the function to low resistance measurement.
⑪	Function switch	Switches measurement functions and selects voltage for insulation resistance measurement.

* KEW 3551 doesn't have ④ to ⑧ buttons.

2. Side panel

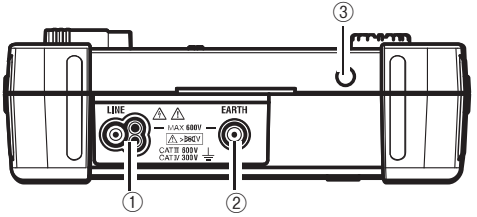


Fig. 4-2

	Name	Description
①	LINE terminal	To connect MODEL7260 test lead.
②	EARTH terminal	To connect MODEL7261A test lead.
③	LED spot light	Illuminates the measurement spot. The light automatically turns on/ off depending on the ambient brightness.

3. LCD

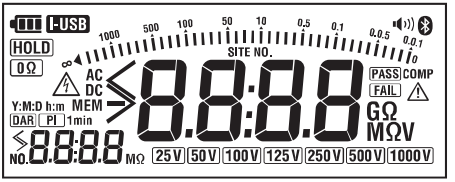


Fig. 4-3

Name	Description
	Battery status indicator
	Bar graph display of insulation resistance
GΩ MΩV	Digital display with measurement unit
NO. MΩ	Memory No., elapsed testing time, threshold value for PASS/ FAIL, 1-min value, and DAR/ PI values
HOLD	Appears to show the measured value is being held.
	Appears and blinks while measuring insulation resistance and for live circuit warning.

	“>” symbol appears when the measured value is exceeding the measuring range, and “<” symbol appears when the measured dc has negative polarity.
0Ω	Appears when 0ΩADJ is done.
	Appears at Bluetooth communication (3552BT only)
	Buzzer ON
I-USB	Appears at IR communication (3552/ 3552BT only)
Y:M:D h:m	Blinks while adjusting time (3552/ 3552BT only)
DAR	Indicates a DAR value is displayed. (3552/ 3552BT only)
PI	Indicates a PI value is displayed. (3552/ 3552BT only)
1min	Indicates 1-min value is displayed.
COMP	Comparator function is enabled.
25V 50V 100V 125V 250V 500V 1000V	Indicates the rated measurement voltage value selected at insulation resistance measurement.
PASS	Indicates the measured insulation resistance value exceeds the pre-set threshold value.
FAIL	Measured insulation resistance value is less than the threshold value.
MEM	Appears while accessing the internal memory. (3552/3552BT only)
AC, DC, —	Appears during a voltage measurement: “AC” for ac voltage, DC for dc voltage, and minus symbol for negative dc voltage.

5. Accessories

● Test leads

(1) Teat lead with remote control switch MODEL7260 (red)

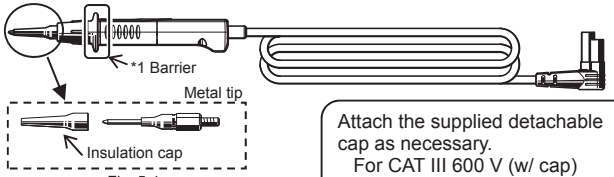


Fig. 5-1

Attach the supplied detachable cap as necessary.
For CAT III 600 V (w/ cap)
For CAT II 1000 V (w/o cap)

(2) Extension prod long MODEL8017A

* Attached and used with MODEL7260.



Fig. 5-2

Long type and helpful to access the distant measurement spot

(3) A set of test lead with alligator clip MODEL7261A

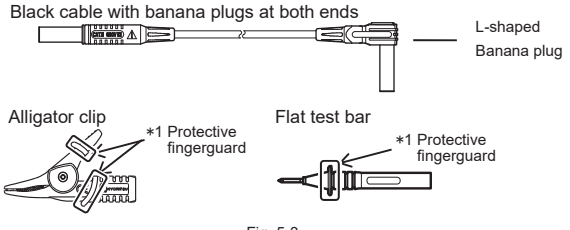


Fig. 5-3

* 1 Protective fingerguard is a part providing protection against electrical shock and ensuring the minimum required clearance and creepage distances.

● Other accessories

(1) Carrying case MODEL9173
(2) Shoulder strap MODEL9121
(3) Four AA alkaline batteries
(4) Instruction manual

6. Getting started

6-1 Attaching metal tip/ adapter for test leads

The following metal tips and adapters are user-changeable depending on measurement purposes.

(1) For MODEL7260

The following metal tips are available.

1. Standard metal tip..... Installed at a shipment supplied with a detachable insulation cap.
2. MODEL8017A ..... Long type and helpful to access the distant point.

[How to replace the parts]

Turn the tip of MODEL7260 counter-clockwise and remove the metal tip. Insert the metal tip you want to use into the hexagon hole, and turn the tip part of the probe clockwise to tighten firmly.

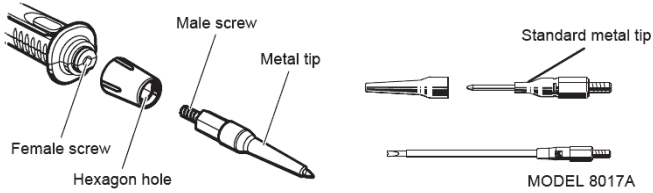


Fig. 6-1

(2) For MODEL7261A

Either of the following adapters can be attached to.

1. Alligator clip
2. Flat test bar

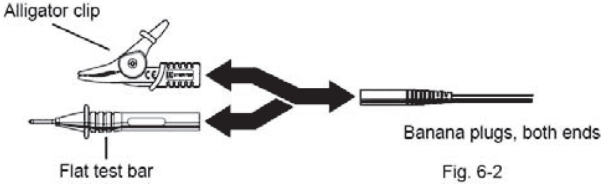


Fig. 6-2

⚠ DANGER

To avoid getting electrical shocks, disconnect the test leads from the instrument before replacing the metal tip or adapter.

6-2 Battery voltage check

(1) Please refer to *16. Battery replacement* in this manual and insert batteries in the instrument.

(2) Set the function switch to any position other than OFF to power on the instrument.

(3) Check the battery status indicator displayed at the upper left corner of the LCD.

"▮▮▮" : Normal. Battery voltage is enough.

"▮▯" : Low battery voltage : For continuous measurement, please refer to *16. Battery replacement* and replace the batteries with new ones.

"▯" : Battery voltage is below the lower limit of the operating voltage. In such a condition, accuracy of the measured result isn't guaranteed. Replace the batteries with new ones immediately.

- Battery status indicator might change from "▮▮▮" to "▯" during a measurement depending on measured objects; for example, resistance of the object is low.
- Use of AA alkaline battery is recommended. Using other type of batteries may cause improper indication of battery level.

7. Voltage measurement

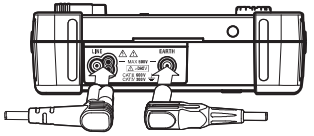
⚠ DANGER

- Do not apply a voltage exceeding the measuring range, 600 V max., to the instrument.
- Keep your fingers behind the barrier during a measurement.
- Verify proper operation on a known source before taking actions as a result of the indication of the instrument.

7-1 Measurement method

(1) Set the function switch to V/ Ω position. To measure low resistance, press the SELECT button (< 1 sec).

(2) Connect the test leads as the following figure shows.
- MODEL7260 to the LINE terminal
- MODEL7261A to the EARTH terminal



Red Black

Fig. 7-1

(3) Connect the black test lead to the earth side of the circuit under test and the red remote probe to the line side.

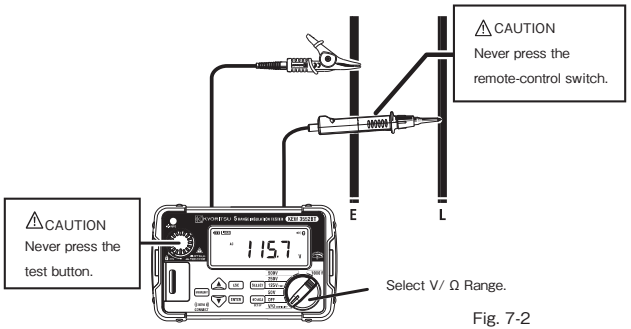


Fig. 7-2

(4) Check the reading on the LCD without pressing the test button nor remote control switch. The instrument detects ac/ dc automatically, and shows "DC" for dc input and "AC" for ac input.

- When negative dc voltage is defected at the line probe side, minus "-" polarity sign is displayed with a measured value.
- If the measured voltage is less than 2 V, AC/ DC auto-detection doesn't work.

Note:

If the measured value exceeds the display range (over-range), the LCD shows :

"$>$629 V" : for ac voltages,

"$>$849 V" : for positive dc voltages, and

"$<$-849 V" : for negative dc voltages.

8 Insulation resistance measurement

This instrument is used to measure insulation resistance of electric appliance or circuit to inspect the insulation performance. Check the voltage rating of the circuit to be tested before making measurement and select the voltage applied to.

Note:

- Depending on the circuit to be measured, displayed insulation resistance value may not stabilize.
- Buzzer may sound during an insulation resistance measure-ment, however, this is not a malfunction.
- Measurement time may be longer when measuring a capacitive load.
- In insulation resistance measurement, the earth terminal outputs positive voltage and the line terminal negative voltage.
- Connect the earth lead to the earth (ground) terminal at measurement. It is recommended to connect the positive side to the earth side when measuring insulation resistance against ground or when a part of the object under test is earthed. Such connection is known to be more suitable for insulation testing since insulation resistance values measured with the positive side connected to earth are typically less than those taken through the reversed connection.

⚠ DANGER

- Be extremely careful not to touch the tip of test probe or the circuit under test to avoid electrical shock during insulation measurement since high voltage is present at the tip of the test probe continuously.
  Wipe the test probe with a soft cloth, if it is wet, and use it after it's dry.
- The battery compartment cover must be closed before you operate the instrument.

⚠ CAUTION

Always disconnect power to the equipment under test before starting insulation measurement. Do not attempt to make measurements on a live circuit; otherwise, it may damage the instrument.

8-1 Measurement method

(1) Connect the test leads as the following figure shows.
- MODEL7260 to the LINE terminal
- MODEL7261A to the EARTH terminal

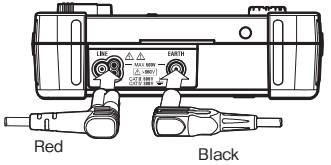


Fig. 8-1

(2) Confirm that the circuit under test isn't energized, and measure voltage with reference to *7. Voltage measurement*.

(3) Confirm the voltage value which can be applied to the circuit under test, and then set the function switch to the desired range.
- There is an empty range between 500 V and 1000 V ranges for safety purpose. The instrument doesn't start a measurement even if the test button is pressed while the function switch is set to this safety position.
- Discontinuous warning buzzer sounds when the function switch is set to 1000 V range.
- To select 100 V range, set the function switch to 125 V/ 100 V position, and then press the SELECT button 1 sec. or longer.

(4) Connect the black earth test lead to the earth terminal of the circuit under test. If a voltage of 30 V or higher exists in the circuit, the LCD backlight blinks red and blinking live warning symbol "⚠" appears with audible buzzer. While this warning function is activating, no resistance measurement can be made even if the test button is pressed.

(5) Place the tip of red test lead (line) to the circuit under test, and press the test button or remote switch.
- Measurement time, elapsed time, is displayed on the LCD during insulation resistance measurement: up to 99 min. 59 sec. by 1 sec.
  Note: The time counter stops and freezes when it reaches to 99 min. 59 sec.; if the elapsed time exceeds 100 min.

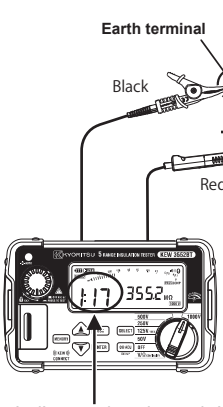


Fig. 8-2

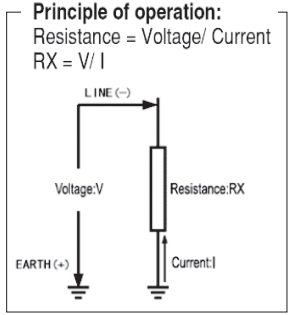


Fig. 8-3

(6) Auto discharge function

This function allows electric charges stored in the capacitance of the circuit under test to be automatically discharged after measurement. Set the test button or remote-control switch to off with the test leads connected.

Discharge can be checked with the blinking "⚠" symbol and buzzer, and red blinking LCD backlight.

⚠ DANGER

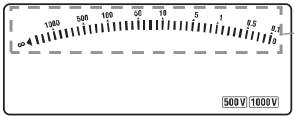
Never touch the circuit under test immediately after measurement.
Capacitances stored in the circuit may cause electric shock. Leave the test leads connected to the circuit, and do not touch the circuit until blinking "⚠" goes off.

(7) Power off the instrument when measurement completes and disconnect the test leads.

- The instrument holds the measured value display when a measurement completes. You can save the result in the internal memory in this state (3552/3552BT only). For the detail of memory function, please refer to *13. Memory function*. The held display can be released by turning the function switch or starting another measurement.

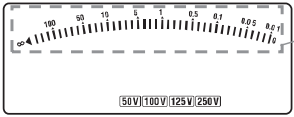
● Bar graph

Depending on the selected measurement range, values on each tick of bar graph vary as shown below.



Bar graph for
500 V/ 1000 V range

Fig. 8-4



Bar graph for 50 V/ 100 V/
125 V/ 250 V range

Fig. 8-5

8-2 Continuous measurement

For continuous measurement, use the lock-down feature incorporated on the test button. Pressing and turning the test button clockwise locks the button in the operating position. Turning counter-clockwise unlock the button.

⚠ DANGER

Be extremely careful not to touch the tips of test leads to avoid getting electrical shock since high voltage is present continuously.

8-3 Voltage characteristics of measurement terminals

This instrument conforms to IEC 61557. This standard defines that the rated measurement current shall be at least 1 mA, and the lower limit of the insulation resistance maintaining the rated measurement voltage at measurement terminals. (See the table below.) This value is calculated by dividing the rated voltage by rated current. ie., in case that the rated voltage is 500 V, the lower limit of the insulation resistance is found as follows.

Divide 500 V by 1 mA equals 0.5 MΩ.

That is, insulation resistance of 0.5 MΩ or more is required to provide the rated voltage to the instrument.

Rated voltage	50V	100V	125V	250V	500V	1000V
Lower limit of the insulation resistance to provide the rated current of 1 mA	0.05 MΩ	0.1 MΩ	0.125 MΩ	0.25 MΩ	0.5 MΩ	1 MΩ

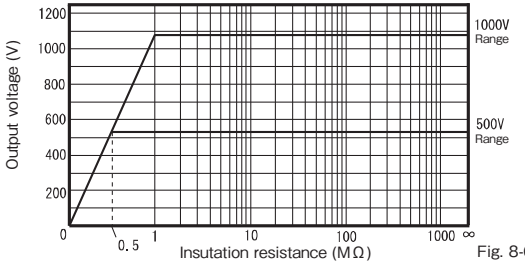


Fig. 8-6

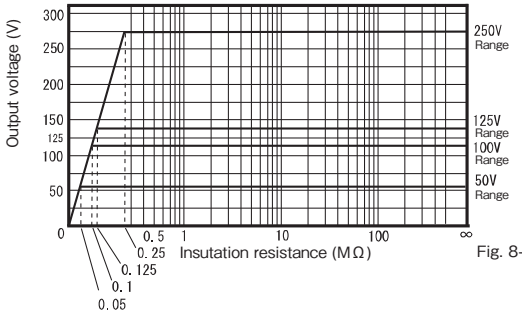


Fig. 8-7

8-4 20G/ 40GΩ range (3552/3552BT only)

The 20GΩ and 40GΩ ranges are available for measuring 500 V and 1000 V respectively. (This is NOT available on KEW 3551.)

Enabling/ disabling 20GΩ/ 40GΩ range affects and changes the configurations of 500V and 1000V ranges as shown in the following table.

1. While 20GΩ/40GΩ ranges are disabled (default settings):

Voltage	Four measurement ranges
500V	4.000 MΩ/ 40.00 MΩ/ 400.0 MΩ/ 2000 MΩ
1000V	4.000 MΩ/ 40.00 MΩ/ 400.0 MΩ/ 4000 MΩ

2. While 20GΩ/40GΩ ranges are enabled:

Voltage	Five measurement ranges
500V	4.000 MΩ/ 40.00 MΩ/ 400.0 MΩ/ 2000 MΩ/ 20 GΩ
1000V	4.000 MΩ/ 40.00 MΩ/ 400.0 MΩ/ 4000 MΩ/ 40 GΩ

8-4-1 Settings

(1) To enable measurements on 20GΩ/ 40GΩ range:

1. Get the instrument into setting mode.
2. Set the function switch to any position other than low-resistance measurement, and then hold down the SETUP button (≥ 2 sec.) while in the stand-by mode.
3. Use the cursor key and toggle the screens for 20GΩ/ 40GΩ range setting. The LCD shows "40GΩ" and indicates the current setting with blinking "on" or "oFF".



Fig. 8-8

(2) Press the ENTER to switch "on" and "oFF".



Fig. 8-9



Fig. 8-10

(3) Press the ESC button to save the changed settings and the instrument returns to stand-by mode. (The changes you made won't be cleared even after powering off the instrument.)

8-5 Insulation status indicator

8-5-1 Reference value for insulation status, Pass/ Fail, judgement

The instrument can compare the measured insulation value and the pre-set reference value listed below. LCD backlight lights up and buzzer sounds according to the result. This function can be turned off.

With KEW 3552/ 3552BT, you can select any desired value as a reference value; the reference values are fixed and unchangeable on KEW 3551 .

● Reference values for KEW3551

Rated voltage	50V	100V	125V	250V	500V	1000V
Reference value (Ω)	0.1M	0.1M	0.125M	0.25M	0.5M	1M

These reference values are determined based on the resistance value to provide 1 mA with the rated voltage. The color of LCD backlight indicates the result as follows.

Compared result	LCD backlight color
exceeding the reference value	Solid green
reference value or less	Solid red

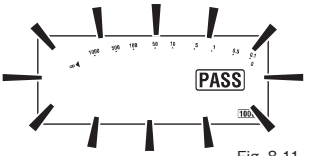


Fig. 8-11

When a measured value is higher than the reference value: "PASS" symbol appears, and green LCD backlight lights up.

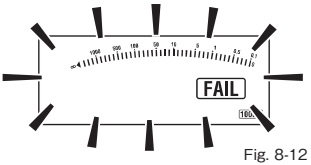


Fig. 8-12

When a measured value is equal to or lower than the reference value: "FAIL" symbol appears, and red LCD backlight lights up.

8-5-2 Reference value settings

To turn off this status indicator function or alter the reference value to any desired value (available only on 3552/ 3552BT), follow the procedures described below.

* The setting procedures depend on each model. Please refer to the explanation about the model you're using.

[KEW 3551]

(1) Set the function switch to the insulation resistance range you wish to set the reference value.

(2) Press the COMP button to toggle the values. The currently selected settings can be checked on the LCD indications.

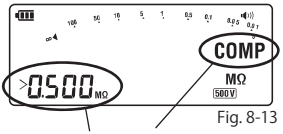


Fig. 8-13

Insulation status indicator is ON.
The LCD shows "COMP" and the reference value.

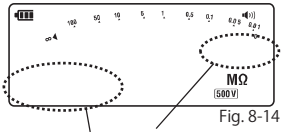


Fig. 8-14

Insulation status indicator is OFF.
No "COMP" nor reference value are displayed.

(3) You can set this status indicator to ON or OFF for each range, respectively. (The settings won't be cleared even after powering off the instrument.)

[KEW 3552/ 3552BT]

(1) Get the instrument into setting mode.

1. Set the function switch to any position other than low-resistance measurement, and then hold down the SETUP button (≥ 2 sec.) in stand-by mode.
2. Use the cursor key and select the range to set the reference value.

"**COMP**" and the selected range blink.

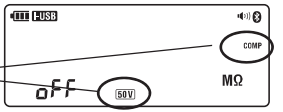


Fig. 8-15

3. Press the ENTER button.

"**COMP**" and the reference value start blinking.

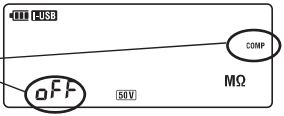


Fig. 8-16

(2) Press the cursor key to toggle the reference values. Press the ENTER button to set and save the displayed value as a reference value. The following values are selectable.

Selectable values	OFF, 0.100 MΩ, 0.125 MΩ, 0.200 MΩ, 0.250 MΩ, 0.400 MΩ, 0.500 MΩ, 1.000 MΩ, 10.00 MΩ, 100.0 MΩ, Any (Selectable range: 0.000 MΩ – 4199 MΩ)

Select "Any" to set your desired value as a reference value:

1. Select the place of decimal point with cursor key, and press ENTER to confirm.



Fig. 8-17

2. Determine the value for ones place, and press ENTER to confirm.

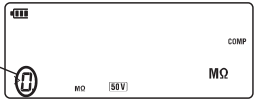


Fig. 8-18

3. Determine the value for tenths place, and press ENTER to confirm.



Fig. 8-19

4. Determine the value for hundredths place, and press ENTER to confirm.

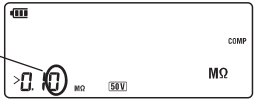


Fig. 8-20

5. Determine the value for thousandths place, and press ENTER to confirm.

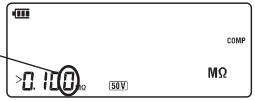


Fig. 8-21

To go one step back, press the ESC button.
When "**COMP**" symbol and range indication start blinking, it means the settings are completed.

(3) Press the ESC button when settings complete. The selected reference values are saved, and the instrument returns to stand-by mode.
(The saved reference values won't be cleared even after powering off the instrument.)

8-6 DAR/ PI measurement, 1-min value display (KEW 3552/3552BT only)
8-6-1 DAR/ PI measurement and 1-min value display

The instrument can measure and calculate DAR (Dielectric Absorption Ratio) and PI (Polarization Index) values automatically during an insulation resistance measurement. (not available on KEW 3551)

- The DAR value is displayed in 1 minute and the PI value in 10 minutes after starting a measurement.
- The following table shows the formula and display range.

Formula	$DAR = \frac{\text{Resistance value (1 min after a start of test)}}{\text{Resistance value (15 sec after a start of test)}}$ $PI = \frac{\text{Resistance value (10 min after a start of test)}}{\text{Resistance value (1 min after a start of test)}}$
Display range	0.00 - 9.99

* If a denominator, the measured resistance, used in the above formula is 0 MΩ; the LCD shows "no" for DAR/ PI value. When the calculated DAR/PI values exceed the display range, the LCD shows ">9.99" .

8-6-2 Indication

Press the cursor key, in 1 min. after starting a measurement, to check 1-min value or DAR/ PI values. (Please wait at least 10 min. to check PI value.)
The following indications show what value is currently displayed.

●1-min value:
"**1min**" symbol and the measured value.



Fig. 8-22

●DAR value:
"DAR" symbol and the DAR value.



Fig. 8-23

●PI value:
"PI" symbol and the PI value.



Fig. 8-24

9. Low resistance measurement (Continuity check)

⚠ DANGER
Do not apply voltage to the low resistance range. Always check the circuit or equipment under test is surely de-energized before starting a measurement.

9-1 Zero Ω ADJ. function
This function is to null the resistances (up to 3 Ω) of the test lead or internal circuit to display the resistance of the equipment under test only.

Setting:
(1) Set the function switch to V/ Ω position.
(2) If the instrument is in the voltage measurement mode, press the SELECT button (< 1 sec) and switch the mode to low-resistance measurement.
(3) Short-circuit the test leads: red lead connected to LINE terminal and black lead connected to EARTH terminal.
(4) Press the 0ΩADJ button while the test button is locked or the remote control switch is held. Then the LCD shows "0.00 Ω" with "[0Ω]" symbol. The nulled value is saved and won't be cleared even after powering off the instrument.
(5) To clear this nulled value, keep the test leads open-circuit status and press the 0ΩADJ button (short press). The symbol "[0Ω]" disappears.
● This 0 ADJ. function doesn't work if the reading is 3 Ω or higher; the LCD shows "no" even the 0ΩADJ button is pressed.

9-2 Measurement
(1) Set the function switch to V/ Ω position.
(2) If the instrument is in the voltage measurement mode, press the SELECT button (< 1 sec) and switch the mode to low resistance measurement.
(3) Connect the test leads to the circuit to be measured and press the test button or remote-control switch.

Principle of operation:
Resistance = Voltage/ Current
RX = V/ I

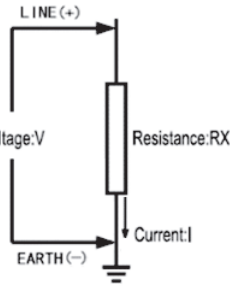


Fig. 9-1

- If a current of 200 mA or higher is detected on the object under test, the continuity buzzer sounds to indicate that there is continuity. If you wish to disable this continuity buzzer, please refer to *10. LCD backlight, LED light, Buzzer.*

- At low resistance measurements, impedances of the operating circuit connected in parallel with the instrument may affect the measurement result.

- Circuit protection
  The instrument has circuit protection function: even if touching with a live circuit during low resistance measurement unintentionally, the instrument will have no damage. That is, the instrument is protected and not be damaged if the open measuring terminals are connected to a live wire.

10. LCD backlight, LED light, Buzzer

10-1 LCD backlight

Illuminance sensor

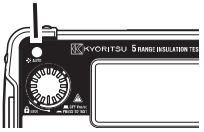


Fig. 10-1

The illuminance sensor on this instrument detects ambient brightness and automatically turns on/ off the LCD backlight and LED light. Once these lights turn on, they stay on for about 15 sec. This auto-lighting function can be set to always off.

- Keep the surface of the illuminance sensor clean to ensure proper detection of brightness.
- The sensitivity of the sensor isn't adjustable.
  Cover the sensor with your finger to turn on the lights manually.
- Even if working in dimly lit area, these lights turn off automatically if the function switch isn't operated or the test button isn't pressed for two minutes. (These lights don't turn off automatically during a measurement or while live circuit warning is activating.)

10-2 Buzzer

Buzzer sounds when:

1. powering on the instrument,
2. turning the function switch or pressing any button,
3. measured current is 200 mA or higher at low resistance measurement, (Continuity buzzer)
4. selecting 1000V range,
5. live circuit warning is activating, and
6. auto-power-off function is activated.
   * For the cases 1. to 3., the buzzer can be set to always off.

10-3 Settings of backlight, LED light, and buzzer

Follow the procedures described on the following pages and change the settings – turning on/ off – of the lights and buzzer.

* The procedures depend on each model. Please refer to the explanation about the model you're using.

[KEW 3551]

(1) Get the instrument into setting mode.

1. Ensure that the instrument is powered off. Hold down the 0ΩADJ button.
2. Keep the 0ΩADJ button held down, and set the function switch to V/Ω position. The instrument wakes up and the LCD segments start blinking to indicate now the instrument is in setting mode.

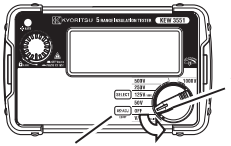


Fig. 10-2

(2) Press the SELECT button to toggle the settings. The settings are toggled in the following sequence: 1 -> 2 -> 3 -> 4 ->1.

Settings	Mode			
	1	2	3	4
Buzzer	ON	OFF	ON	OFF
LCD backlight/ LED light	ON	ON	OFF	OFF

The buzzer symbol and LCD backlight indicate the currently selected mode.

● Buzzer:
Blinking buzzer symbol means "ON" , no symbol means "OFF" .

● LCD backlight/ LED light:
Blinking backlight means "ON" ; if not, it means "OFF". The "on" or "oFF" indication is also displayed at the lower left of the LCD accordingly.

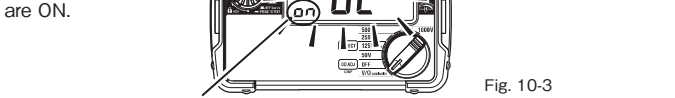


Fig. 10-3

When LCD backlight/LED lights are set to ON, "on" appears, and "oFF" appears when these lights are set to OFF.

(3) Power off the instrument when setting completes. (The latest settings are saved and won't be cleared even after powering off the instrument.)

[KEW 3552/ 3552BT]

(1) Get the instrument into setting mode.

1. Set the function switch to any position other than low-resistance measurement, and then hold down the SETUP button (≥ 2 sec.) while in the stand-by mode.
2. Use the cursor key and toggle the screens for backlight and buzzer setting; the following figures shows each setting screen.

Backlight setting screen:
The LCD shows "**bL**".

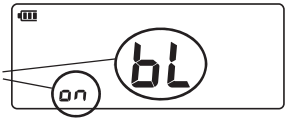


Fig. 10-4

Buzzer setting screen:
The LCD shows "🔊" symbol.

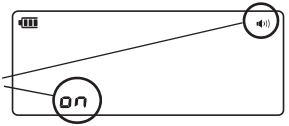


Fig. 10-5

(2) Press the ENTER button to toggle the settings. The currently selected setting can be checked by "on" or "oFF" indication shown in the LCD.



Fig. 10-6



Fig. 10-7

(3) The instrument exits from the setting mode by pressing the ESC button. The changes you made are saved and won't be cleared even after powering off the instrument.

11. Auto-power-off

To prevent the instrument being left powered on and conserve battery power, the instrument automatically turns off approx. 10 min. after the last switch operation with audible buzzer sound. To turn on the instrument, turn the function switch to “OFF” position first, then set it to the desired range.

This auto-power-off function doesn’t work during a measurement or Bluetooth data communication. (KEW 3552BT only)

12. Clock setting (KEW 3552/ 3552BT only)

This instrument has an internal clock and can save the measured data with time information. (Not available on KEW 3551.)

12-1 Setting

(1) Get the instrument into setting mode.

1. Set the function switch to any position other than low resistance measurement, and then hold down the SETUP button (≥ 2 sec.) while in the stand-by mode.
3. Use the cursor key and toggle the screens for clock setting; blinking "**Y:M:D h:m**" appears on the LCD.

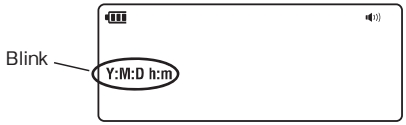


Fig. 12-1

(2) Press the ENTER button and adjust time and date according to the following sequences.

1. Use the cursor key to adjust the last two digits of year, and confirm with the ENTER button.



Fig. 12-2

2. Use the cursor key to adjust the month and date, and confirm with the ENTER button.



Fig. 12-3

3. Use the cursor key to adjust the current time, and confirm with the ENTER button.



Fig. 12-4

To go one step back, press the ESC button.
Setting completes when blinking "**Y:M:D h:m**" appears after step 3. described above.

(3) Pressing the ESC button saves the changes you made and the instrument returns to stand-by mode. The changes you made are saved and won't be cleared even after powering off the instrument.

13. Memory function (KEW 3552/ 3552BT only)

This instrument can save voltage, insulation resistance, and low resistance measurement results in the internal memory, 1000 results max. Data can be saved with two different site number for easy recognition. (Not available on KEW 3551.)

● Data to be saved:
Measured voltage, insulation resistance, and low resistance, DAR/ PI, 1-min value, time and date, measurement function, and the data and site no. selected when saving the result.

● Data can be recalled:
Measured voltage, insulation resistance, and low resistance values, measurement function, and the data no. and site no. selected at saving the result. To check DAR/ PI value, 1-min value, time and date information, you need to transfer the data to PC. Please refer to *14. Infrared data transmission* for further detail.

Items saved with the measured result	Details	Selectable range
Data No.	Select and assign a number for the data to be saved. The number will be automatically increased by 1.	0 - 999
SITE No.1 (Site No. 1)	Select and assign any number for the measurement data. (depending on the buildings or circuits)	0 - 99
SITE No.2 (Site No. 2)		0 - 99

13-1 Saving method

(1) Measured result is displayed and being held when a measurement completes. (As for voltage measurement, data can be saved during a measurement.)

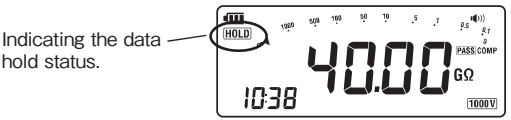


Fig. 13-1

(2) Press the MEMORY button (< 1 sec.).

(3) Use the cursor key and select “SITE No. 1”, and press the ENTER button to confirm.

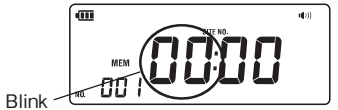


Fig. 13-2

(4) Use the cursor key and select “SITE No. 2”, and press the ENTER button to confirm.

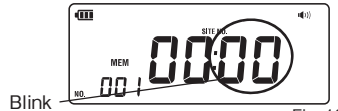


Fig. 13-3

(5) Use the cursor key to select the “Data No.”, and press the ENTER button to confirm. (Data No. is updated automatically.)



Fig. 13-4

(6) When data saving completes, the instrument shows stand-by screen. Press the ESC button to modify and re-do the settings.

● Simplified operation
You can skip “SITE No. 1, and 2” and “Data No.” settings and save the data just by pressing the MEMORY button in steps (3) - (5). In this case, “SITE No. 1, and 2” used at the previous saving are used, and “Data No.” is automatically increased by 1.

13-2 Recalling the data

(1) Hold down the MEMORY button (≥1sec.) in stand-by mode.
(2) Use the cursor key to switch the Data no.



Fig. 13-5

(3) Press the SELECT button to show the SITE No. again. Another press of the SELECT button returns to the measured value display screen.

(4) Press the ESC to return to the stand-by mode.

13-3 Deleting the data

(1) Hold down the MEMORY button (≥ 1sec.) in stand-by mode, and recall the saved data.

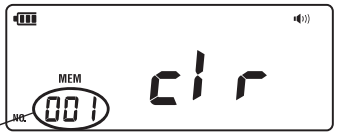
(2) Use the cursor key to select the data no. you wish to delete. To delete all the saved data, select "ALL". ("ALL" is displayed between "0" and "999".)



Wishing to delete all the saved data.

Fig. 13-6

(3) The LCD shows "clr" by pressing the ENTER button. Another press of ENTER deletes the selected data. Press the ESC button to return to the selection screen.



Data no. to be deleted blinks.

Fig. 13-7

(4) Press the ESC button to return to stand-by mode.

14. Infrared data transmission (KEW 3552/ 3552BT only)

The internal memory data can be transferred to PC by using the optical adapter MODEL8212 USB. (Not available on KEW 3551.)

14-1 How to transfer data

(1) Ensure that the special application "KEW Report" has been installed in your PC.

(2) Disconnect the test leads from the instrument.

(3) Connect MODEL8212 USB to the USB port of the PC.

(4) Open the cover for optical adapter and connect MODEL8212USB. Please see Fig. 14-1 and 14-2 shown below.

(5) Power on the instrument. You can set the function switch to any position.

(6) Start "KEW Report" on your PC and click "Download" to start data download. For further detail, please refer to the instruction manual for MODEL8212 USB or HELP for KEW Report.

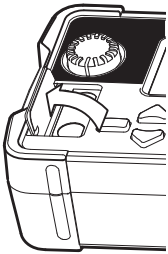


Fig. 14-1

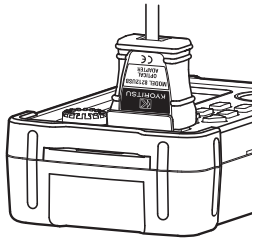


Fig. 14-2

15. Bluetooth communication (KEW 3552BT only)

15-1 Bluetooth communication

KEW3552BT has a Bluetooth communication function and can exchange data with Android/ iOS tablet devices. (Not available on KEW 3551/ 3552.) Before starting to use this function, download the special application "KEW Smart for KEW3552BT" via the internet.

Some functions are available only while connected to the internet. For further detail, please refer to *15-2. KEW Smart for KEW 3552BT*.

⚠ WARNING

Radio waves at Bluetooth communication may affect the operations of medical electronic devices. Special care should be taken when using Bluetooth connection in the areas where such devices are present.

Cautions:

- Using the instrument or tablet devices near wireless LAN devices (IEEE802.11.b/g) may cause radio interferences, lowering of communication speed, resulting in significant time lag in the display update rate between the instrument and tablet device. In this case, keep the instrument and the tablet device away from the wireless LAN devices, or turn off the wireless LAN devices, or shorten the distance between the instrument and the tablet device.
- It may be difficult to establish communication connection if either the instrument or tablet device is in a metal box. In such a case, change the measurement location or remove the metal obstacle between the instrument and the tablet device.
- If any leaking of data or information occurs while making a communication using Bluetooth function, we assume no responsibility for any released content.
- Some tablet devices, even if the application runs properly, may fail to establish communication with the instrument. Please use another tablet device and try to communicate with. If you still cannot confirm the connection, there may be some problem with the instrument unit. Please contact your local KYORITSU distributor.
- The Bluetooth word mark and logos are owned by Bluetooth SIG, Inc. and we, KYORITSU, are licensed by them for use.
- Android, Google Play Store, and Google Maps are the trademark or registered trade mark of Google Inc.
- iOS is the trademark or registered trade mark of Cisco.
- Apple Store is the service mark of Apple Inc.
- In this manual, the "TM" and " ® " marks are omitted.

15-2 KEW Smart for KEW 3552BT

The special application "KEW Smart for KEW 3552BT" is available on download site for free. (An Internet access is required.) Please note that communication charge is incurred separately for downloading applications and using special features of them. For your information, "KEW Smart for KEW 3552BT" is provided on-line only.

Features of KEW Smart for KEW 3552BT:

- Remote monitoring/ checking
- Data save/ recall function
- Insulation status indicator
  Buzzer sounds when the measured value is below the reference value.
  Please see *8-5. Insulation status indicator*.
- Map display (available on Android devices only)
  Measured locations can be checked on the Google Maps if the saved data includes GPS location info.
- Comment editing
  Measured result can be saved with comments.

The latest information about "KEW Smart for KEW 3552BT" can be checked with the site on Google Play Store or App Store.

16. Battery replacement

Replace batteries with new ones when the battery indicator shows "▮▭" ; battery level is almost empty.

⚠ DANGER

- Do not open the battery compartment cover if the instrument is wet.
- Never attempt to replace batteries during a measurement. When opening the battery compartment cover, ensure that the instrument is powered off and no test leads are connected to, in order to avoid getting electrical shock.
- The battery compartment cover must be closed and screwed before making measurement.

⚠ CAUTION

- Do not mix new and old batteries nor different types of batteries.
- Install batteries in correct polarity as marked inside.

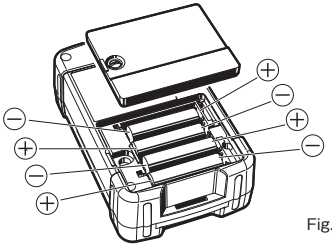


Fig. 16-1

(1) Power off the instrument and disconnect the test leads.

(2) Loosen one screw fixing the battery compartment cover, and remove the cover.

(3) Replace all four batteries with new ones at the same time with observing correct polarity. Use of size AA alkaline battery (LR6) x 4 is recommended.

(4) Install the battery compartment cover and tighten one cover-fixing screw.

17. Shoulder strap belt attachment

Strap belt is supplied with this instrument to suspend from the neck to allow both hands to be used freely for easy and safe operation.

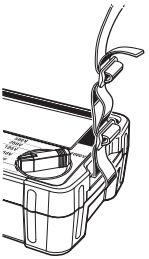


Fig. 17-1

18. Storing in carrying case

Store the instrument and test leads as the following figure shows.

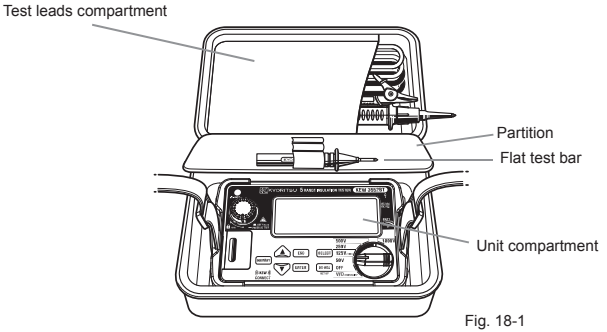


Fig. 18-1

⚠ CAUTION

● Always power off the instrument before storing it in the carrying case.

DISTRIBUTOR

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

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