KEW1020R Digital Multimeters Instruction Manual

Contents

Kew

KEW1020R Digital Multimeters

Product Information Digital Multimeter KEW1020R

The Digital Multimeter KEW1020R is a measuring instrument designed to measure voltage, current, and resistance. It has a large LCD display that shows accurate readings of the measurements taken. The instrument is designed, manufactured, and tested according to IEC 61010 safety requirements for electrical equipment.

The instrument has the following features:

- LCD display
- Select key function switch
- HOLD/backlight key
- REL/MAXMIN key
- COM terminal cap
- Voltage terminal protective finger guard
- CAT IV 300V/ CAT III 600V / CAT II 1000V rating
- Test leads M-7066A with supplied caps are designed for CAT IV600V/ CAT III 1000V and without the caps are for CAT II 1000V.

The instrument is suitable for use in circuits which are not directly connected to the mains power supply (O), primary electrical circuits of equipment connected to an AC electrical outlet by a power cord (CAT II), primary electrical circuits of the equipment connected directly to the distribution panel, and feeders from the distribution panel to outlets (CAT III), and the circuit from the service drop to the service entrance, and to the power meter and primary over current protection device(distribution panel) (CAT IV).

Product Usage Instructions

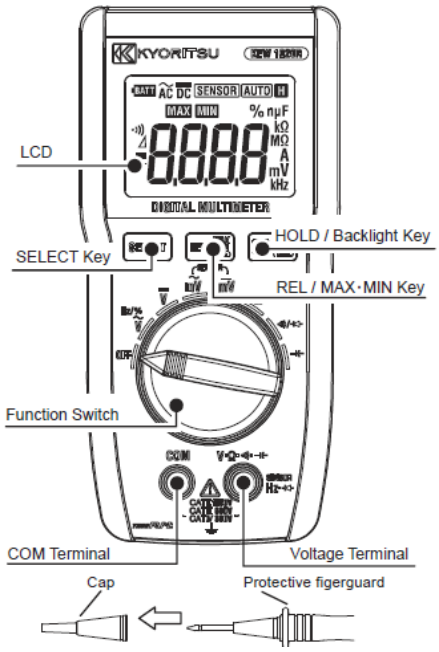
Before using the Digital Multimeter KEW1020R, read through and understand the instructions contained in the instruction manual. Keep the manual at hand to enable quick reference whenever necessary. The instrument is to be used only in its intended applications. Understand and follow all the safety instructions contained in the manual.

When using the instrument, follow these steps:

1. Ensure that the instrument is suitable for the circuit being measured. Never make measurements under the circumstances exceeding the designed measurement category and the rated voltage of the instrument.
2. Ensure that there are no flammable gasses present when making measurements. Otherwise, the use of the instrument may cause sparking, which can lead to an explosion.
3. Do not attempt to use the instrument if its surface or your hand is wet.
4. Connect the test leads to the appropriate terminals on the instrument.
5. Connect the test leads to the circuit being measured.
6. Read the measurement on the LCD display.
7. If necessary, use the select key function switch, HOLD/backlight key, or REL/MAXMIN key to adjust the measurement or display options.
8. After use, disconnect the test leads from both the circuit being measured and the instrument.

Following these instructions will ensure safe operation of the instrument and maintain it in safe condition. Failure to follow these instructions may impair the protection provided by the instrument and test leads, and 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 this cautionary note.

OVERVIEW



Test Lead Cap
Test leads can be used under the CAT II and CAT III and CAT IV environments by attaching a protective cap as illustrated below. Use of our protective cap offers different lengths suitable for the test environments. Choose and use the test leads and caps that are suitable for the measurement category. When the instrument and the test lead are combined and used together, whichever lower category either of them belongs to will be applied.

Protective figerguard
It is a part providing protection against electrical shock and ensuring the minimum required air and creepage distances.

Safety Warnings

This instrument has been designed, manufactured and tested according to IEC 61010: Safety requirements for electrical equipment, and delivered in the best condition after passing quality control tests. This instruction manual

contains warnings and safety rules which have to 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 using the instrument.

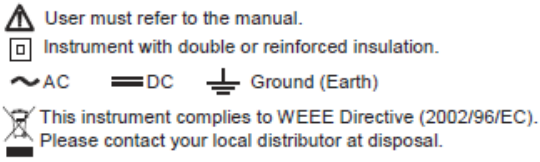
WARNING

- Read through and understand the instructions contained in this manual before using 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 impair the protection provided by the instrument and test leads, and 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 this cautionary note.

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

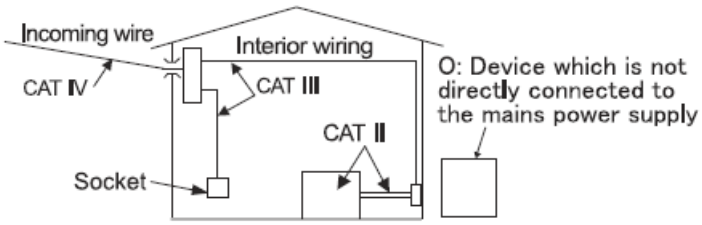
Symbols listed below are used on this instrument



Measurement Category
O Circuits which are not directly connected to the mains power supply.

- CAT II Primary 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 over current protection device(distribution panel).

This instrument is designed for CAT IV 300V/ CAT III 600V / CAT II 1000V. Test leads M-7066A with the supplied caps are designed for CAT IV600V/ CAT III 1000V and without the caps are for CAT II 1000V.



DANGER

- Never make measurements under the circumstances exceeding the designed measurement category and the rated voltage of the instrument.
- Do not attempt to make measurement 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.
- Do not exceed the maximum allowable input of any measuring range.
- Never open the Battery compartment cover during a measurement.
- To avoid electrical shock by touching the equipment under test or its surroundings, be sure to wear insulated protective gear.
- Test leads to be used for voltage measurements shall be rated as appropriate for Measurement Category III or IV according to IEC 61010-031 and shall have a voltage rating of 1000V or higher.
- Keep your fingers and hands behind the protective figerguard during measurement.

WARNING

- Never attempt to make measurement if any abnormal conditions, such as broken case and exposed metal parts are found on the instrument or test leads.
- Verify proper operation on a known source before use or take action as a result of the indication of the instrument.
- Firmly attach the caps to the test leads when performing measurements in CAT III or higher test environments. When KEW1020R and the test leads are combined and used together, whichever is lower category & voltage to earth either of them belong to is applied.
- Do not rotate the Function Switch if the instrument and the equipment under test are connected.
- Do not install substitute parts or make any modification to the instrument. For repair or re-calibration, return the instrument to your local KYORITSU distributor.
- Stop using the test lead if the outer jacket is damaged and the inner metal or color jacket is exposed.

CAUTION

- Use of this instrument is limited to domestic, commercial and light industry applications. Strong electromagnetic interference or strong magnetic fields, generated by large currents, may cause malfunction of the instrument.
- Firmly insert the test leads.
- Do not pull or twist the test leads to prevent the risk of damage.
- Power off the instrument after use. Remove the battery if the instrument is to be stored and will not be in use for a long period.

- Do not expose the instrument to direct sunlight, high temperature and humidity or dewfall.
- Use a cloth dipped in water or neutral detergent for cleaning the instrument. Do not use abrasives or solvents.

NOTE

- The LCD shows some digits at the Voltage range even while the test leads are open. And, it may show some digits instead of 0 even if the test leads are shorted. However, these phenomena don't affect measurement results.
- A resistance measurement takes time to settle the reading if there is a high resistance or capacitance components.

Specification

Accuracy (Temperature: 23 ± 5°C, Humidity: 45 – 75%)

ACV / RMS

Range	Display Range	Accuracy (sine wave)
6V	0.000, 0.006 – 6.299V	±1.0 %rdg±3dgt (40-500Hz)
60V	5.70 – 62.99V	
600V	57.0 – 629.9V	
1000V	570 – 1049V	±1.3 %rdg±3dgt (40-500 Hz)

- **Guaranteed accuracy** : 0.01V-1000V, less than 1500V peak
- **Input impedance** : approx. 10MΩ
- **Input protective voltage :** AC/DC1200V 10 sec.

Hz Frequency – ACV measurement

Range	Display Range	Accuracy (sine wave)
99.99Hz	10.00 – 99.99Hz	±0.1%rdg±3dgt
999.9Hz	95.0 – 999.9Hz	
9.999kHz	0.950 – 9.999kHz	
99.99kHz	9.50 – 99.99kHz	

- **Guaranteed accuracy** : 10Hz-99kHz
- **Input protective voltage** : AC/DC1200V 10 sec

DUTY – ACV measurement

Range	Display Range	Accuracy (Square wave)
99.9 %	0.0 – 99.9 %	±1.0%rdg±3dgt (50/60Hz)

- **Guaranteed accuracy** : 10%-90%
- **Input protective voltage** : AC/DC1200V 10 sec.

DCV

Range	Display Range	Accuracy
6.000V	0.000 – ±6.299V	±0.5 %rdg±3dgt
60.00V	±5.70 – ±62.99V	
600.0V	±57.0 – ±629.9V	
1000V	±570 – ±1049V	±0.8 %rdg±3dgt

- **Guaranteed accuracy** : 0V-±1000V
- **Input impedance** : approx. 11MΩ(6V range) / 10MΩ(60/600/1000V range)
- **Input protective voltage** : AC/DC1200V 10 sec

ACmV / RMS

Range	Display Range	Accuracy (sine wave)
600.0mV	0.0, 0.9 – 629.9mV	±2.0 %rdg±3dgt (40-500Hz)

- **Guaranteed accuracy** : 1.2mV-600mV, less than 900mV peak
- **Input impedance** : approx. 900kΩ
- **Input protective voltage** : AC/DC1000V 10 sec.

AC Clamp Sensor / RMS

Range	Display Range	Accuracy (sine wave)
60.00A	0.00, 0.09 – 62.99A	±2.0 %rdg±3dgt + Sensor accuracy (40-500Hz)
200.0A	57.0 – 209.9A	

Direct reading from 10mV / A output Clamp sensor

- **Guaranteed accuracy** : 0.12A-200A, less than 300A peak
- **Input impedance** : approx. 900kΩ

DCmV

Range	Display Range	Accuracy
600.0mV	0.0 – ±629.9mV	±1.5 %rdg±3dgt

- **Guaranteed accuracy** : 0mV-±600mV, Input impedance : approx. 900kΩ
- **Input protective voltage** : AC/DC1000V 10 sec

DC Clamp Sensor

Range	Display Range	Accuracy
60.00A	0.00 – ±62.99A	±1.5 %rdg±3dgt + Sensor accuracy
200.0A	±57.0 – ±209.9A	

Direct reading from 10mV / A output Clamp sensor
Guaranteed accuracy : 0A-±200A, Input impedance : approx. 900kΩ

Resistance

Range	Display Range	Accuracy
600.0Ω	0.0 – 629.9Ω	±0.5 %rdg±4dgt
6.000kΩ	0.570 – 6.299kΩ	±0.5 %rdg±2dgt
60.00kΩ	5.70 – 62.99kΩ	
600.0kΩ	57.0 – 629.9kΩ	
6.000MΩ	0.570 – 6.299MΩ	
40.00MΩ	5.70 – 41.99MΩ	±1.5 %rdg±3dgt

- **Guaranteed accuracy** : 0Ω-40MΩ, Open-loop Voltage : less than 3V
- **Measurement current** : less than 1mA
- **Input protective voltage** : AC/DC1000V 10 sec.

Continuity

Range	Display Range	Accuracy
600.0Ω	0.0 – 629.9Ω	Buzzer threshold value : less than 90Ω (less than 50±40Ω)

- **Open-loop Voltage** : less than 3V, Measurement current : less than 1mA
- **Input protective voltage** : AC/DC1000V 10 sec.

Diode

Range	Display Range	Accuracy
2.000V	0.000 – 2.099V	±5 %rdg±5dgt

- **Guaranteed accuracy** : 0V-2V, Open-loop Voltage : less than 3V
- **Measurement current** : approx.0.5mA (Vf=0.6V)
- **Input protective voltage** : AC/DC1000V 10 sec.

Capacitance

Range	Display Range	Accuracy
60.00nF	0.00 – 62.99nF	±2.0 %rdg±5dgt*
600.0nF	57.0 – 629.9nF	
6.000µF	0.570 – 6.299µF	±5.0 %rdg±5dgt
60.00µF	5.70 – 62.99µF	
600.0µF	57.0 – 629.9µF	
1000µF	570 – 1049µF	

Accuracy after canceling floating capacitance using REL function. Guaranteed accuracy : 0nF-1000µF Input protective voltage : AC/DC1000V 10 sec.

- **Measuring method** : ⊿Σ modulation
- **Over-range indication** : OL
- **Measurement cycle** : 2.5 times per second (1000µF range of Capacitance function 0.05 times per second)
- **Crest factor** : less than 3 (45-65Hz) For non-sinusoidal waveforms, add ±0.5 %rdg±5dgt (Applicable functions : ACV, ACmV, AC clamp sensor)
- **Applicable standards** : IEC 61010-1 /61010-2-033 : CAT IV 300V / CAT III 600V / CAT II 1000V Pollution degree 2, Indoor use, Altitude up to 2000m IEC61010-031 (Test leads Model 7066A) IEC 61326 (EMC)
- **Withstand voltage** : AC5160Vrms 5sec between circuit and enclosure
- **Environmental standards** : EU RoHS Directive compliant
- **IP rating** : IP40 (IEC60529)

- **Insulation resistance** : 100MΩ or more /1000V between enclosure and electrical circuit
- **Operating temperature and humidity range** : 0 to 40°C, 80%RH or less (no condensation)
- **Storage Temperature and humidity range** : -20 to 60°C, 80%RH or less (no condensation)
- **Power source** : DC3V R03/LR03 (AAA) × 2
- **Current consumption** : 3mA or less
- **Battery life** : Approx. 200 hours (ACV, continuous, no load, with R03)
- **Dimension**, **Weight** : 155(L)×75(W)×40(D)mm, approx. 250g (including batteries and Wing-type holder)
- **Accessories** : Test leads (M-7066A), Instruction manual, Battery R03 (AAA) 2pcs, Wing-type holder
- **Option** : Magnet hanger strap (M-9189) Test leads with alligator clips (M-7234) AC Clamp Sensor (KEW8161), AC/DC Clamp Sensor (KEW8115)

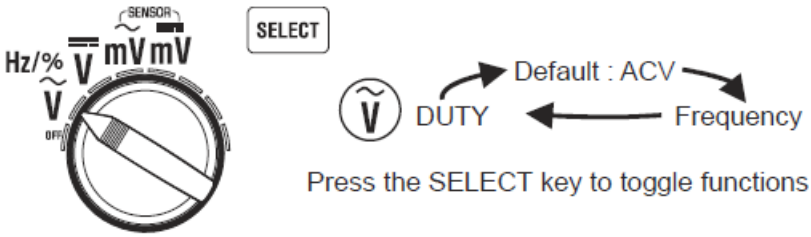
ACV DCV ACmV DCmV Measurement

DANGER

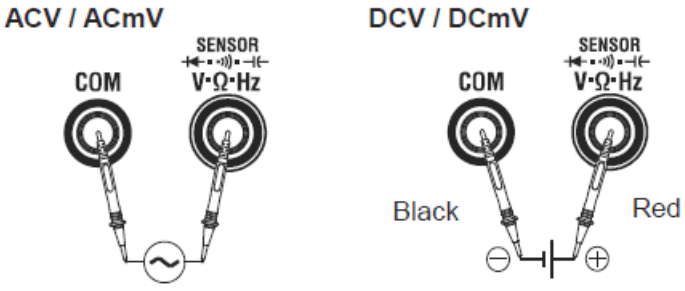
- Before starting a measurement, always check and confirm the Function switch is in the appropriate measurement position.
- Never make measurement on a circuit in which voltage over 1000V exists.
- Keep your fingers and hands behind the protective fingerguard during measurement.

ACV / DCV/ ACmV / DCmV measurement

1. Set the Function switch to ACV, DCV, ACmV or DCmV position. For frequency or DUTY measurement, set the switch to ACV and press the SELECT key.

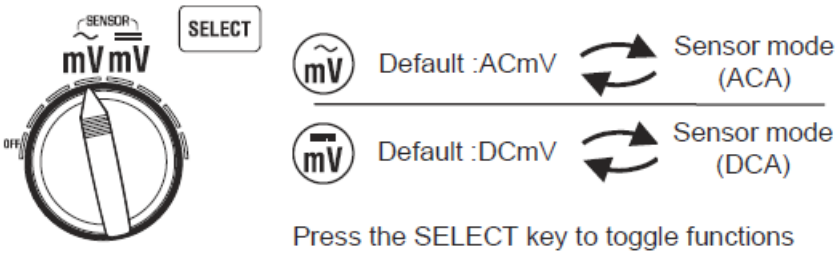


2. Connect the test leads to the Voltage and COM terminals.

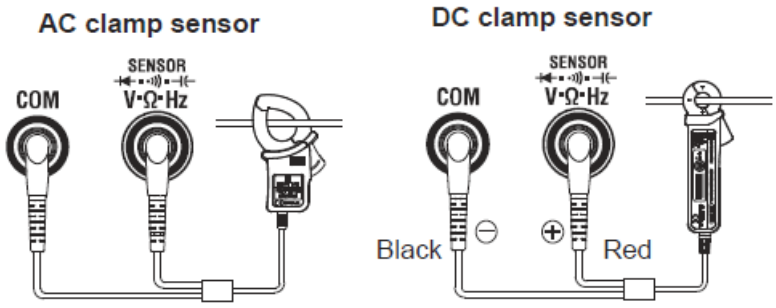


Clamp sensor (option) measurement

1. Set the Function switch to ACmV or DCmV position and press the SELECT key. LCD shows “SENSOR”.



2. Connect the clamp sensor to the Voltage and COM terminals.



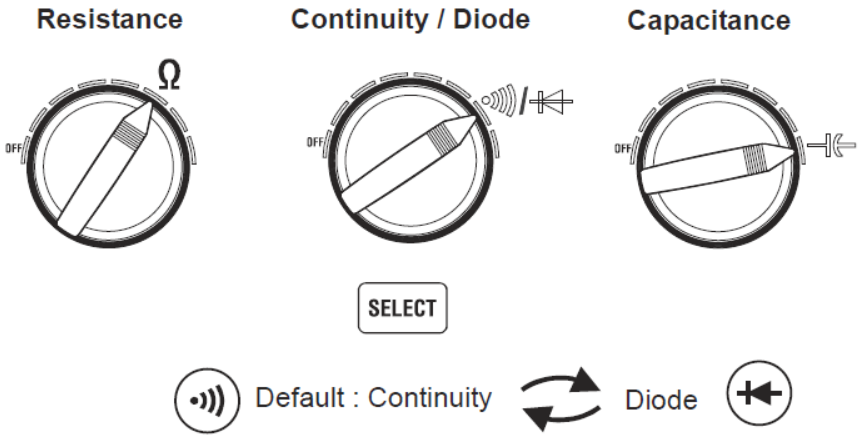
NOTE

- If the connection is reversed, the “ “ mark will be displayed on the LCD. (DCV measurement).
- Press the REL key to adjust the reading on the DC clamp sensor to “0”.
- The sensor mode corresponds to direct reading with 10mV/A output clamp sensor.

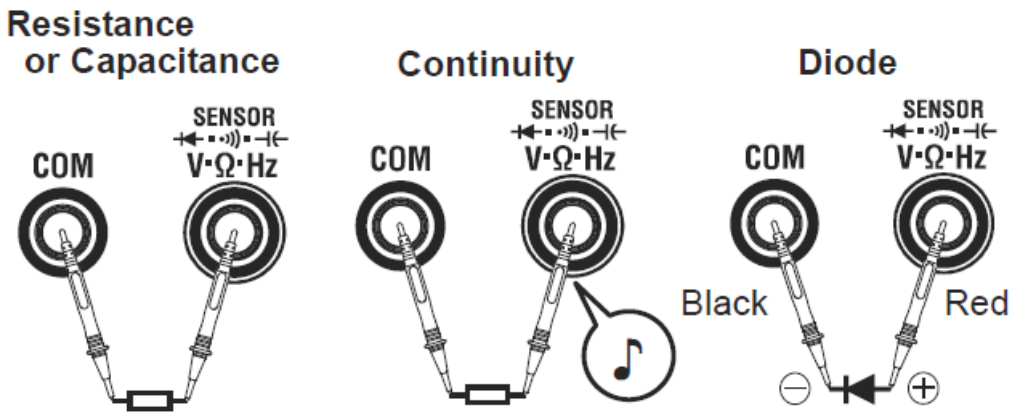
Resistance Diode Continuity Capacitance Measurement

WARNING
Never use the instrument on an energized circuit. Discharge the capacitor before starting a capacitance measurement.

1. Set the Function switch to the resistance, continuity or capacitance position. For diode measurement, press the SELECT key.



2. Connect the test leads to the Voltage and COM terminals.



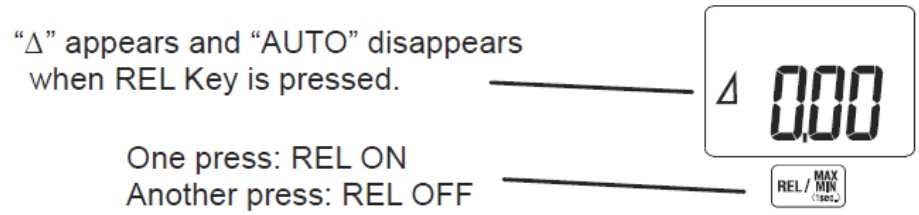
NOTE

- LCD shows ”OL” when the test leads are open. (except for capacitance measurement)
- The LCD shows “OL” if the test lead connection is reversed for diode measurement.
- Measurement time on 600µF/1000µF range is a bit long. (20sec max.)

Other Functions

- **REL Function**

  Press the REL key to enable this function and store the measured value to display the differences between the stored value and the values measured in further tests. The measurement range will be fixed when the REL function is enabled, and the measuring range will be between the initial value and the full scale value. Press the REL Key again to release the stored value.

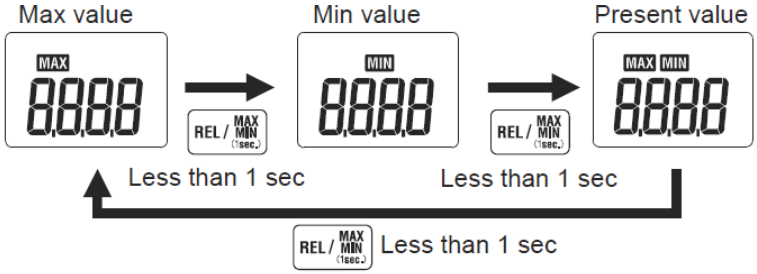


- **Sleep Function**

  Automatically powers off the instrument in about 15 min after the last switch operation. To exit from the Sleep mode, rotate the Function switch or press any key. To disable the Sleep function, press the HOLD/Backlight key and power on the instrument. Confirm that the LCD shows “P.OFF” about 1 sec.

- **Max / Min value display function**

  This function is to display the measured max and min values on the LCD during a measurement. Press the MAX/MIN key 1 sec or longer to start recoding of max and min values. Then the LCD shows the latest max value. After that, the min and present values can be toggled and checked by pressing the MAX/MIN key (less than 1 sec). To disable this function, press the MAX/MIN key 1 sec or longer.



  To activate MAX/MIN function, REL function should be disabled

- **Data hold function**

Press the HOLD key (less than 1 sec). The LCD shows “H” mark and the reading will be held (Data hold mode). The max/ min values are not updated in MAX/MIN mode. Press the HOLD key again (less than 1 sec) to release the display.

- **Backlight function**

  Press the Backlight key 1 sec or longer to turn on the backlight. Press the Backlight key another 1 sec or longer to turn it off. The light automatically turns off in 1 min.

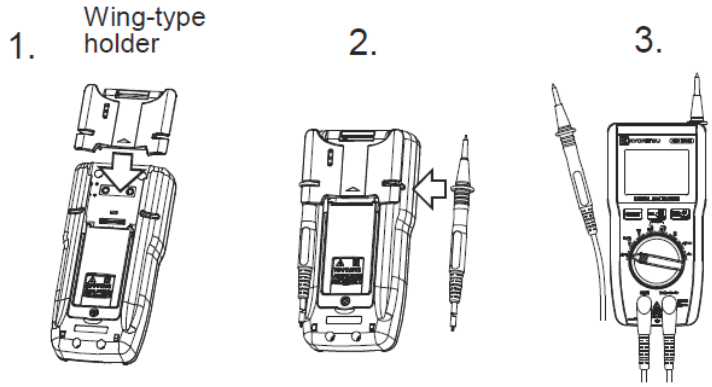
- **Low battery indication**

  The LCD shows “ BATT ” mark when the batteries fall below the normal operating voltage.

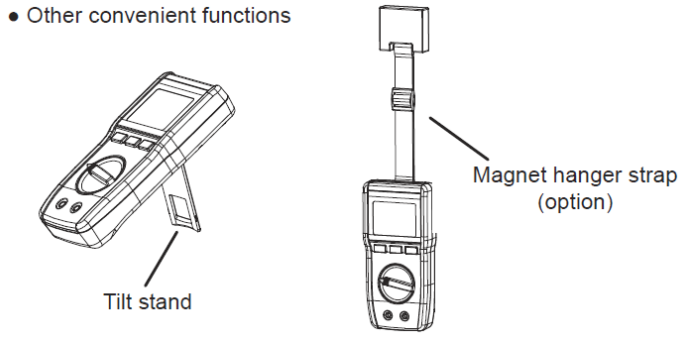
How to store test leads

Attach the Wing-type holder to the back of the instrument to store the test leads.

1. Attach the Wing-type holder to the back of the instrument.
2. Fit the barrier on the test lead into the groove between the instrument and the Wing-type holder.



3. Then it will be easier to see the displayed readings during a measurement.



Battery Replacement

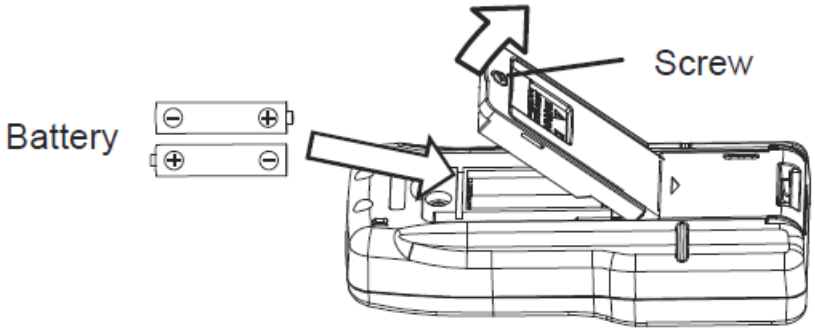
WARNING

- Replace the battery when the “ BATT ” mark- low battery voltage warning- appears on the LCD. Otherwise, precise measurement cannot be made. If the battery is completely exhausted, the LCD goes blank without showing the “ BATT ” mark.
- Disconnect the test leads from the object under test and power off the instrument before opening the Battery compartment cover for battery replacement.
- Do not try to replace the battery if the surface of the instrument is wet.

CAUTION

- Do not mix old and new batteries. Brand and type of the batteries to be used should be harmonized.
- Install a batteries in correct polarity as indicated in the Battery Compartment.

1. Set the Function Switch to “OFF” position.
2. Untighten the screw on the back of the instrument.
3. Remove the Battery compartment cover and replace the batterie.
4. Attach the cover to the instrument and then secure the cover by tightening the screw



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

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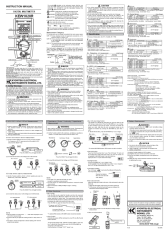
Documents / Resources

	KEW KEW1020R Digital Multimeters [pdf] Instruction Manual KEW1020R Digital Multimeters, KEW1020R, Digital Multimeters, Multimeters