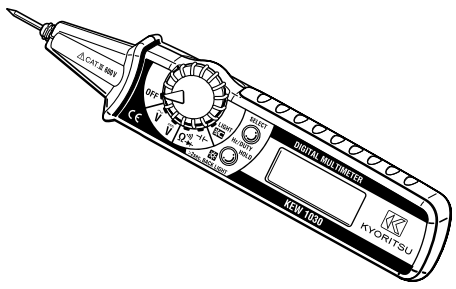
INSTRUCTION MANUAL

Thank you for purchasing our instrument KEW1030.
Before using the instrument,read this manual thoroughly to obtain the maximum performance of this instrument and ensure the correct measurement.



PEN TYPE DIGITAL MULTIMETER

K E W 1030

KYORITSU ELECTRICAL INSTRUMENTS WORKS, LTD.

1. Safety warnings ⚠

○This instrument has been designed, manufactured and tested according to IEC 61010: Safety requirements for Electronic Measuring apparatus, and delivered in the best condition after passed the inspection.
This instruction manual contains warnings 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.

⚠ WARNING
- Read through and understand the instructions contained in this manual before using the instrument.
- Save and 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.
- The RESPONSIBLE BODY shall be made aware that, if the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

○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. Be sure to carefully read the instructions following each ⚠ symbol 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.

○ Please refer to following explanation of the symbols used on the instrument and in this manual.

⚠	User must refer to the explanations in the instruction manual.
□	Instrument with double or reinforced insulation
~	AC
⎓	DC

○**Read through the following safety instructions contained in this manual before using the instrument.**

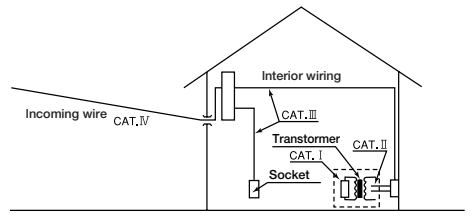
⚠ DANGER
- Never make measurement on a circuit in which electrical potential to ground over 600V exists.
- Do not attempt to make measurement in the presence of flammable gasses. Otherwise, the use of the instrument may cause sparking, which can lead to an explosion.
- Never attempt to use the instrument if its surface or your hand is wet. Otherwise, you may get electrical shock.
- Never open the Bottom case and Battery cover during a measurement.

⚠ WARNING
- Never attempt to make any measurement if any abnormal conditions, such as broken case and exposed metal parts are present on the instrument or test lead.
- Do not install substitute parts or make any modification to the instrument. Return the instrument to your local Kyoritsu distributor for repair or re-calibration.

⚠ CAUTION
- Always set the Function switch to the appropriate position before making measurement.
- Do not expose the instrument to the direct sun, high temperatures and humidity or dew.
- This instrument is designed for in-door use. It can be used under the temperature between 0℃ and 40℃ without impairing its safety characteristics.
- This instrument doesn't have dust/water-proof construction. Do not use the instrument in dusty area or where it easily gets wet. It may lead to failure of the instrument.
- Set the Function switch to "OFF" position after use. Remove the batteries if the instrument is to be stored and will not be in use for a long period.

○Measurement categories (Over-voltage categories)
To ensure safe operation of measuring instruments, IEC61010 establishes safety standards for various electrical environments, categorized as CAT.I to CAT.IV, and called measurement categories. These are defined as indicated below.
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.

CAT. I : Secondary electrical circuits connected to an AC electrical outlet through a transformer or similar device.
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).



2. Features

This instrument is a pen-type digital multimeter and can measure: AC/DC voltage, resistance, capacitance and frequency/duty ratio. It also provides continuity check and diode check functions.

- Designed to meet the following safety standards.
  IEC61010-1 measurement category (CAT.) III 600V
  IEC61010-031 (for hand-held Probe assemblies)
- Double molded main body and Function switch provide comfortable single handed grip.
- Penlight illuminates brightly the point to be measured.
- Backlight LCD is highly visible, even in darkness.
- REL function to check the difference (DC.V/ CAP).
- Auto-power-off function to save battery.
- Data hold function
- All ranges including Ohm range are protected against overload voltage of 600V.
- Test lead is wrapped in its rear side compartment without difficulty.
- Test pin can be covered by a unique cover mechanism for safety.

3. Specification

3 — 1 Accuracy [guaranteed at temperature & humidity: 23±5℃, 45~85% RH(*1)]

Function	Range	Accuracy	Max. input voltage
ACV Auto-ranging(*2)	4V	±1.3%rdg±5dgt (50/60Hz)	DC 600V AC 600Vrms(sin)
	40V	±1.7%rdg±5dgt (~400Hz)	
	400V	±1.6%rdg±5dgt (50/60Hz)	
	600V	±2.0%rdg±5dgt (~400Hz)	
DCV Auto-ranging(*2)	400mV	±0.8%rdg±5dgt	
	4V		
	40V		
	400V		
	600V	±1.0%rdg±5dgt	
Ω Auto-ranging	400Ω	±1.0%rdg±5dgt	
	4kΩ		
	40kΩ		
	400kΩ		
	4MΩ		
	40MΩ	±2.5%rdg±5dgt	
Diode check/ Continuity Check	Diode check	Test voltage:approx. 0.3V~1.5V	
	Continuity Check	Buzzer sounds when resistance is 120Ω or less.	
Capacitance Auto-ranging	50nF	±3.5%rdg±10dgt	
	500nF	±3.5%rdg±5dgt	
	5uF		
	50uF		
	100uF	±4.5%rdg±5dgt	
Frequency Auto-ranging	5Hz	±0.1%rdg±5dgt Measurable input: 1.5Vrms or more	
	50Hz		
	500Hz		
	5kHz		
	50kHz		
	200kHz		
DUTY(pulsewidth/ pulse cycle)	0.1~99.9%	±2.5%rdg±5dgt(Accuracy is guaranteed up to 10kHz.)	

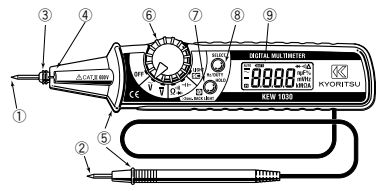
Note:
Following abbreviations are used in above table.
- **rdg** is an abbreviation of "reading", and it means the indicated value at a measurement.
- **dgt** is an abbreviation of "digit", and it means the figure to be displayed at the rightmost digit.
- (*1): Except for 40MΩ range at Ohm function.
- (*2): At Voltage function, the Auto-ranging function is released by pressing the SELECT key. To measure a voltage again, turn the Function switch to the "**OFF**" position once. Then set it to the Voltage function again.

3 — 2 **General specification**
- Method of operation : △Σ method
- Display : Liquid crystal display (max. 3999 counts)/Units/ Marks
- Over-range indication : "**OL**" displayed when exceeding the measuring range. (except for AC/DC 600V range)
- Range switching : Fully-automatic range (Single range is available at Continuity, Diode check and DUTY range.) Range shifts to upper range:4000 counts or more. Range shifts to lower range:less than 360 counts.
- Sample rate : twice per second
- Functional construction : OFF/ ACV/ DCV/ Ω/ Capacitance
- Key : HOLD/ Hz/ DUTY/ ⊣▸⊢/ ·))/ REL Δ (only at DCV and Capacitance ranges)
- Power source : Button type battery LR44(SR44)1.5V x 2
- Low battery warning : "BATT" mark is displayed at 2.4V±0.2V or less.
- Dimension : 190(L) x 39(W) x 31(D)mm
- Weight : Approx. 100g (including batteries)
- Location for use : Altitude up to 2000m, in-door use
- Operating temperature & humidity range : 0~40℃, relative humidity 85% or less (no condensation)
- Storage temperature & humidity range : -20~60℃, relative humidity 85% or less (no condensation)
- Accessories : Carrying case x 1
  Button type battery LR44(1.5V) x 2
  Instruction manual x 1
- Standards (Safety) : ・IEC/EN 61010-1:2001
  Measurement category (CAT.) III 600V
  Pollution degree 2
  ・IEC/EN 61010-031:2002
  (EMC) : ・EN 61326:2001

3 — 3 **Electrical characteristics**
- Temperature & humidity range (guaranteed accuracy) : 23℃±5℃, relative humidity 85% or less (no condensation)
- Supply voltage range (guaranteed accuracy) : 3.4V till the "BATT" mark is displayed.
- Insulation resistance : 10MΩ or more/ DC1000V (between electrical circuit and case enclosure)
- Withstand voltage : AC5.55kVrms, sine wave (50/60Hz for 1 min.) (between electrical circuit and case enclosure)
- Overload protection (Over-voltage protection) : 720V (AC/DC) for 10 sec. at voltage function 600V (AC/DC) for 10 sec. at all functions other than voltage function
- Rated supply voltage : DC3.0V
- Rated power : Approx. 4mVA (when battery voltage is 3.0V)
- Max. rated power : Approx. 30mVA (when lights are on)
- Continuous operating time : Approx. 80 hours (DCV measurement) Approx. 15 hours (A operation; turning the light on for 10 sec. and off for 20 sec., is repeated.)

4. Instrument layout

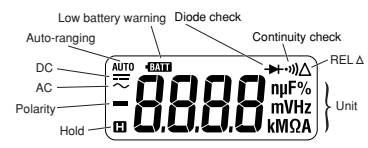
4 — 1 Instrument layout



①Test pin (input terminal (+); red)
②Test lead (input terminal (−); black)
: Connected to the negative (−) side or the earth of the circuit.
③ Protective cover
: Covering the Test pin for safety purpose.
④ Penlight
⑤ Barrier
⑥ Function switch

■OFF : Power off (Battery will not be wasted.)
■ V̄ AC voltage (ACV) ➡ Frequency (Hz) ➡ DUTY(%)
Switches by pressing the "SELECT" key.
■ V̄ DC voltage (DCV) ➡ REL Δ (relative value display)
Switches by pressing the "SELECT" key.
■ Ω Resistance ➡ ⊣▸⊢ Diode check ➡ ·)) Continuity check
Switches by pressing the "SELECT" key.
■⊣⊢ Capacitance➡ REL Δ (relative value)
Switches by pressing the "SELECT" key.

■ LIGHT : Turning on the Penlight. Set the Function switch to this position first, and then turn it to any desirable function position. Then the Penlight turned on and illuminates the test point. (Measurement cannot be performed in this switch position.)
⑦ HOLD key
・Freezing the indicated value.
・Turning on the LCD backlight. (Press this key at least 2 sec.)
⑧ SELECT key
・Switching the measurement modes. (V̄ / Hz/ DUTY and Ω/ ⊣▸⊢ / ·)))
・Enable/ Disable the REL Δ function. (Only at DCV/ Capacitance)
⑨ LCD indication

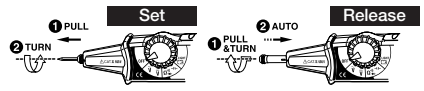


4 — 2 Protective cover

⚠ CAUTION
- Do not apply excessive force to the Test pin and the Protective cover.
- Be careful not get hurt by the tip of the Test pin when setting or releasing the Protective cover.

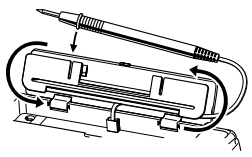
Use the Protective cover to cover the Test pin when carrying or storing the instrument.

1 Method of setting the Protective cover
Pinch the tip of the Protective cover, and pull it towards the tip direction. Then turn it 90 degrees as shown in the figure below to match the marks on the cover and on the instrument body.



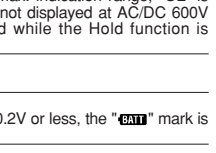
2 Method of releasing the Protective cover
Pinch the tip of the Protective cover, and pull it towards the tip direction. Then turn it 90 degrees as shown in the above figure. Then the cover is stored automatically and the Test pin (positive terminal) appears.

4 — 3 **Method of storing the test lead**
Test lead is stored in the rear side compartment of the instrument. Cord is winded around the cord holder.



5. Functions

- Auto-ranging (AUTO)
  A function to automatically select the appropriate measurement range based on the input signal. The "**AUTO**" mark is displayed on the LCD while this function is activated. This function is not available in Diode check, Continuity check and Duty ratio measurements. The "**AUTO**" mark is not displayed.
- Hold function (H)
  A function to freeze the measured value on the LCD. (Not available in Frequency measurement)
  The "H" mark is displayed on the LCD when the HOLD key is pressed. Then the measured value is frozen. Press this key again or switch the measurement function to others to release the Hold function.
- REL function (Δ)
  A function to display the difference between the measured values (relative value) on the LCD at DCV and Capacitance functions. The "Δ" mark is displayed on the LCD when the HOLD key is pressed. Then the value being measured is stored. After that, the difference between the stored value and the measured value is displayed on the LCD. Press this key again or switch the measurement function to others to release the REL function.
- Auto-power-off function
  A function to turn off the instrument when 30 min. have elapsed after the Function switch is switched from OFF to the other measurement function. Press the HOLD key again or switch the measurement function to others to restore from the Auto-power-off state.
- Over-range indication
  When the measured value exceeds the max. indication range, "**OL**" is displayed on the LCD. (This indication is not displayed at AC/DC 600V range.) This indication is not displayed while the Hold function is activated.
- Low battery warning (BATT)
  When the battery voltage drops to 2.4V±0.2V or less, the "BATT" mark is displayed on the LCD.
- Penlight
  Set the Function switch to "LIGHT" position to turn on the Penlight. Turn the switch to any desirable function position. (Measurement cannot be performed when the switch is in "LIGHT" position.) Turn the switch to "OFF" position to turn off the light.



- LCD backlight
  The LCD backlight lights up by pressing down the HOLD key at any measurement function other than OFF at least 2 sec..
  Press down this key again at least 2 sec. or turn the Function switch to OFF once to turn off the light.

Note
- Penlight and LCD backlight are not turned off automatically. Be sure to turn them off when they are not in use.
- When turning on/ off the LCD backlight, the "H" mark is displayed on the LCD and the Hold function is activated. Press the HOLD button for a while to release the function and perform the next measurement.

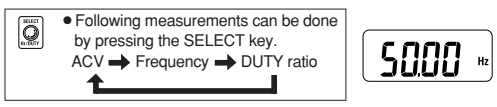
6. Measurement

⚠ DANGER
To prevent electrical shock to person and damage to the instrument, following instructions must be observed.
- The max. rated voltage to ground is AC/DC600V. Never attempt to make measurement on a circuit in which electrical potential to the ground exceeding this voltage exists.
- The max. input voltage is DC600V/AC600Vrms (sin). Never attempt to make any measurement on a circuit in which electrical potential exceeding this voltage exists.
- Do not operate the Function switch during a measurement.
- Never make a measurement with the Bottom case is removed.
- Keep your fingers and hand behind the barrier (see 4-1) of the instrument and test lead.
- Be careful not to short-circuit the line under test with the metal part of the instrument or the test lead during a measurement.
- Never make measurement on an energized circuit at Resistance, Diode check, Continuity check and Capacitance function of this instrument.

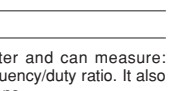
6 — 1 AC voltage(ACV), Frequency and DUTY ratio measurement

1 Set the Function switch to" V̄ "position.
2 Connect the Test pin and test lead to AC circuit as shown in the figure below to measure AC voltage (ACV).

3 Press the SELECT key and select the Frequency range to measure a frequency. In this case, the unit "**Hz**" is displayed on the LCD.



4 Press the SELECT key and select the DUTY ratio range to measure a DUTY ratio (Pulse width/ Pulse cycle). In this case, the unit "%" is displayed on the LCD.

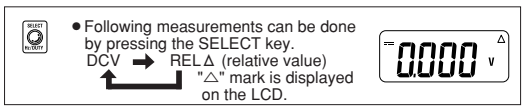


Note
- At ACV function, a few dgts may remain displayed on the LCD after removing the input.
- Connect the test lead (minus terminal) to the earth side of the circuit under test. When the circuit under test does not have the earth, any connection is allowed.
- At Frequency and DUTY ratio measurement, the measurable min. input is approx. 1.5Vrms.

6 — 2 DC voltage(DCV) measurement

1 Set the Function switch to" V̄ "position.
2 Connect the Test pin to the positive (+) side of the equipment under test and the test lead to the negative (−) side as shown in the figure below. When test lead is connected to the positive (+) side, the "-" mark is displayed on the LCD.

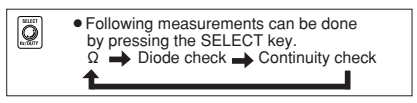
3 Press the SELECT key to display a REL value (relative value).
Press this key and store the initial measured value. After that, the difference between the stored value and the measured value is displayed on the LCD. Auto-ranging function doesn't activate when this function is enabled. The first selected range will be held. The relative measurement is allowed in the following range.
* Measuring range = Full scale value at a range — initial value
Press this key again or switch the measurement function to others to release the REL function.



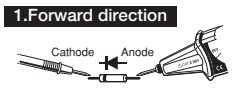
6 — 3 Resistance (Ω) measurement, Diode/ Continuity check

1 Set the Function switch to" Ω "position.
2 Connect the Test pin and test lead to the equipment under test as shown in the figure below.

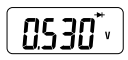
3 Press the SELECT key to conduct the Diode check.
Connect the Test pin and the test lead to the equipment under test. When following indication is confirmed, the diode is good.



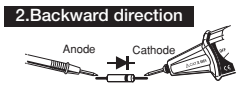
1.Forward direction



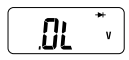
(Example)
Forward voltage is displayed.



2.Backward direction

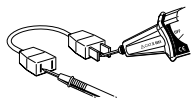


(Example)
"OL"
is displayed.



Note
- When the forward voltage of diode is out of the range of 0.3V~1.5V, measurement may not be done. (Zener diode, LED and etc.)

4 Press the SELECT key to conduct the Continuity check. Connect the Test pin and the test lead to the equipment under test.
Buzzer sounds when continuity is ok. (120Ω or less)
Resistance value of 400Ω or less is displayed on the LCD.

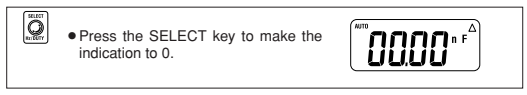


Note
- Indicated value may not be "0" after shorting the tip of the test lead. However, this is because of the resistance of the test lead and not a failure.

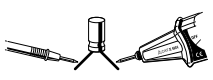
6 — 4 Capacitance measurement (nF, μF)

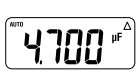
1 Set the Function switch to "⊣⊢" position.

2 Press the SELECT key to make the indicated value to "0" before connecting the test lead to the equipment under test.



3 Connect the Test pin and the test lead to the equipment under test as shown in the figure below.





Note
- Measuring time varies depending on the capacitance to be measured.

Capacitance to be measured	<4μF	<40μF	<100μF
Measuring time	2 sec.	7 sec.	15 sec.

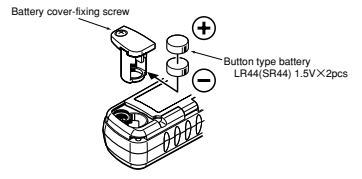
7. Battery replacement

⚠ WARNING
- To avoid getting electrical shock, be sure to remove the measuring terminals from the equipment under test; set the Function switch to OFF position before replacing batteries.

⚠ DANGER
- Do not mix new and old batteries. Never mix the different kinds of batteries.
- Make sure to install batteries in correct polarity as marked inside.
- Be sure to fasten the Battery case-fixing screws after the battery replacement.

⚠ CAUTION
- Dispose the used batteries according to the rules, which are defined by each community.

①Set the Function switch to OFF position.
②Loosen one Battery cover-fixing screw, and remove the Battery cover.
③Replace the batteries with new ones. Make sure to install batteries in correct polarity as marked inside. Always replace all two batteries with new ones at the same time.
④Put the Battery case at the original position, and fasten the screws.



8. Maintenance

- Cleaning
  Use a cloth dipped in water or neutral detergent for cleaning the instrument.
  Do not use abrasives or solvents. Otherwise, instrument get damaged,deformed or discolored.

DISTRIBUTOR

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