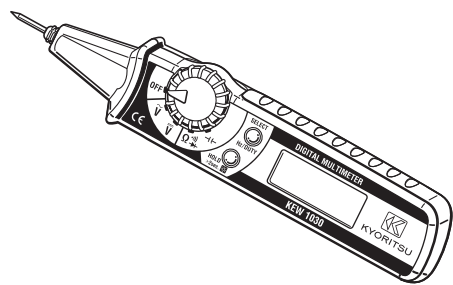


# INSTRUCTION MANUAL



## PEN TYPE DIGITAL MULTIMETER

# K E W 1030

**KYORITSU ELECTRICAL INSTRUMENTS WORKS, LTD.**

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.
- Do not exceed the maximum allowable input of any measuring range.
- Never try to make measurement if any abnormal conditions, such as broken case is noted.
- The instrument should be used only in its intended applications or conditions. Otherwise, safety functions equipped with the instrument do not work, and instrument damage or serious personal injury may be caused.
- Verify proper operation on a known source before use or taking action as a result indication of the instrument.
- Keep your fingers and hands behind the protective fingerguard during 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.
- Do not turn the function switch with plugged in test leads connected to the circuit under test.
- Do not try to replace the batteries if the surface of the instrument is wet.
- Always switch off the instrument before opening the battery compartment cover for battery replacement.
- Stop using the test lead if the outer jacket is damaged and the inner metal or color jacket is exposed.

### ⚠ 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°C and 40°C 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.
- Be sure to set the function selector switch to the "OFF" position after use. When the instrument will not be in use for a long period of time, place it in storage after removing the battery.
- Use a damp cloth and detergent for cleaning the instrument. Do not use abrasives or solvents.

### Measurement categories (Over-voltage categories)

To ensure safe operation of measuring instruments, IEC61010 establishes safety standards for various electrical environments, categorized as O 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 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.

Designed to meet CAT III 600V when the cap and protective cover is attached to the test lead and to meet CAT II 600V when the cap and protective cover is not attached to the test lead.

## 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.

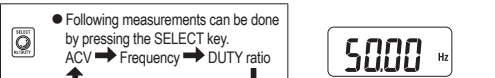
- Designed to meet the following safety standards. IEC61010-1 measurement category (CAT) III 600V IEC61010-031 (for hand-held Probe assemblies)
- Double molded main body and Function switch provide comfortable single handed grip.
- Penlight illuminates brightly the point to be measured.
- Backlight LCD 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.

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

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



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



- 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.

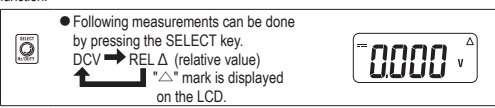
### 6-2 DC voltage(DCV) measurement

- Set the Function switch to "V" position.
- 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.



- 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

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



### 3. Specification

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 (1 ~ 400Hz)	
	400V	± 1.6%rdg ± 5dgt (50/60Hz)	
DCV Auto-ranging(2)	400mV	± 0.8%rdg ± 5dgt	DC 600V AC 600Vrms(sin)
	4V	± 0.8%rdg ± 5dgt	
	40V	± 1.0%rdg ± 5dgt	
Ω Auto-ranging	400 Ω	± 1.0%rdg ± 5dgt	DC 600V AC 600Vrms(sin)
	4k Ω	± 1.0%rdg ± 5dgt	
	40k Ω	± 1.0%rdg ± 5dgt	
	400k Ω	± 1.0%rdg ± 5dgt	
	4M Ω	± 1.0%rdg ± 5dgt	
Diode check/ Continuity Check	40M Ω	± 2.5%rdg ± 5dgt	DC 600V AC 600Vrms(sin)
	Continuity Check	Buzzer sounds when resistance is 120 Ω or less.	
Capacitance Auto-ranging	50nF	± 3.5%rdg ± 10dgt	DC 600V AC 600Vrms(sin)
	500nF	± 3.5%rdg ± 5dgt	
	50μF	± 3.5%rdg ± 5dgt	
Frequency Auto-ranging	100μF	± 4.5%rdg ± 5dgt	DC 600V AC 600Vrms(sin)
	5Hz	± 0.1%rdg ± 5dgt	
	50Hz	± 0.1%rdg ± 5dgt	
	500Hz	± 0.1%rdg ± 5dgt	
	5kHz	± 0.1%rdg ± 5dgt	
DUTY(pulsewidth/pulse cycle)	50kHz	± 2.5%rdg ± 5dgt(Accuracy is guaranteed up to 10kHz)	DC 600V AC 600Vrms(sin)
	200kHz	± 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.  
 ● (\*) : Except for 40M Ω 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

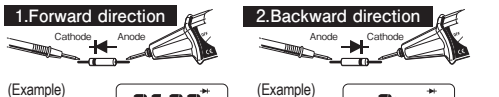
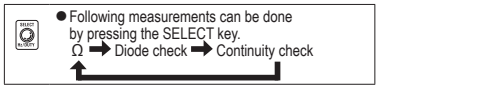
- Method of operation : ΔΣ method
- Liquid crystal display (max. 3999 counts)/Units/ Marks
- Over-range indication : "OL" displayed when exceeding the measuring range, (except for AC/DC 600V range)
- Fully-automatic range : Single range is available at Continuity, Diode check and DUTY range.
- Range switching : Range shifts to lower range:4000 counts or more. Range shifts to upper range:less than 360 counts.
- Sample rate : twice per second
- Functional construction : OFF/ACV/DCV/Ω/Capacitance
- Key : HOLD/Hz/DUTY/REL/Δ
- 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°C, relative humidity 85% or less (no condensation)
- Storage temperature & humidity range : -20~60°C, 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) : IEC61010-1, IEC/EN 61010-2-033  
 Measurement category (CAT) III 600V  
 Pollution degree : IEC/EN 61010-031  
 EN61326 (EMC) · EN50581 (RoHS)

### 3-3 Electrical characteristics

- Temperature & humidity range : 23°C±5°C, relative humidity 85% or less (no condensation)
- Supply voltage range (guaranteed accuracy) : 3.4V till the "BATT" mark is displayed.
- Supply voltage range (guaranteed accuracy) : 10MΩ or more/DC1000V (between electrical circuit and case enclosure)
- Insulation resistance : AC5158Vrms, sine wave (50/60Hz for 5 sec.) (between electrical circuit and case enclosure)
- Withstand voltage : 720V (AC/DC) for 10 sec. at voltage function 600V (AC/DC) for 10 sec. at all functions other than voltage function
- Overload protection (Over-voltage protection) : DC3.0V
- Rated supply voltage : Approx. 4mVA (when battery voltage is 3.0V)
- Rated power : Approx. 30mVA (when lights are on)
- Max. rated power : Approx. 80 hours (DCV measurement)
- Continuous operating time : Approx. 15 hours (A operation, turning the light on for 10 sec. and off for 20 sec., is repeated.)

### 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.



- 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. (120 Ω or less) Resistance value of 400 Ω or less is displayed on the LCD.



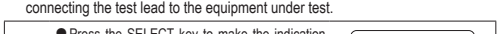
- Note**
- Indicated value may not be "0" after shorting the tip of the test lead. However, this is because of the resistance of the test lead and not a failure.

### 6-4 Capacitance measurement (nF, μF)

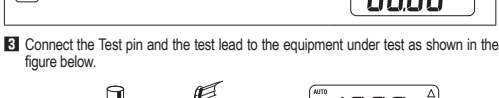
- Set the Function switch to "F" position.



- Press the SELECT key to make the indication to 0.



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



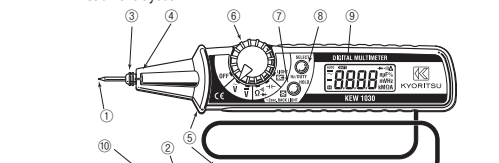
**Note**

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

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

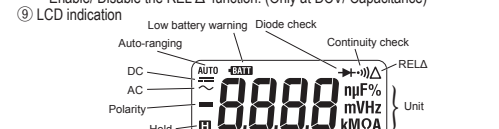
## 4. Instrument layout

- Instrument layout



- Test pin (input terminal (+); red)
- Test lead (input terminal (-); black) : Connected to the negative (-) side or the earth of the circuit.
- Protective cover : Covering the Test pin for safety purpose.
- Penlight
- Protective fingerguard : It is a part providing protection against electrical shock and ensuring the minimum required air and creepage distances.
- Function switch

- OFF : Power off (Battery will not be wasted.)
- V AC voltage (ACV) → Frequency (Hz) → DUTY(%)  
 Switches by pressing the "SELECT" key.
- V 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.
- F 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.)
- HOLD key : Freezing the indicated value.  
 - Turning on the LCD backlight. (Press this key at least 2 sec.)
- SELECT key : Switching the measurement modes. (V/Hz/DUTY and Ω/→/←/→/←)  
 - Enable/Disable the REL Δ function. (Only at DCV/ Capacitance)
- LCD indication : Low battery warning, Diode check, Continuity check



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

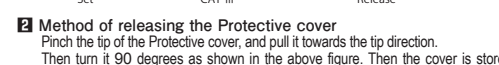
### 4-2 Protective cover

- 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.
- Designed to meet CAT III 600V when the cap is attached to the test lead and to meet CAT II 600V when the cap is not attached to the test lead.

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.

## 7. Battery replacement

- 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.

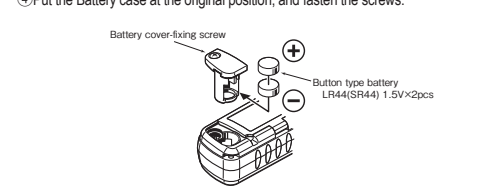
### DANGER

- 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.

- Set the Function switch to OFF position.
- Loosen one Battery cover-fixing screw, and remove the Battery cover.
- Replace 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.
- Put 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

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

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