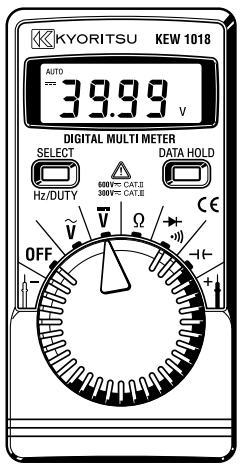
INSTRUCTION MANUAL



CARD TYPE AUTO RANGE DIGITAL MULTIMETER

KEW 1018

KYORITSU ELECTRICAL INSTRUMENTS WORKS,LTD. TOKYO, JAPAN

1. Safety Warnings

This instrument has been designed, manufactured and tested according to the following standards.
IEC 61010-1 Measurement CAT Ⅲ 300V Pollution degree 2
IEC 61010-031
IEC 61326
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 instructions contained in this manual before starting using the instrument.
- Save and keep the manual handy to enable quick reference whenever necessary.
- This instrument should only be used by suitably trained person and be sure to follow measurement procedures described in the manual. Kyoritsu assumes no responsibility for damage and injury caused by misuse or not following instructions in the manual.
- Be sure to understand and follow all safety instructions contained in the manual.

Be sure to observe the above instructions.
Failure to follow the above instructions may cause injury, instrument damage and/or damage to equipment under test.

The symbol ⚠ indicated on the instrument means that the user must refer to 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.

⚠ DANGER
- Never make measurement on the circuit in which electrical potential to ground over 300V AC/DC 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.
- Be sure to keep your fingers behind the Finger barrier part of test lead.
- Never attempt to use the instrument if its surface or your hand is wet.
- Do not open the instrument case when making measurement.

⚠ WARNING
- Never attempt to make any measurement if any abnormal conditions are noted, such as broken case, cracked test leads and exposed metal parts.
- Do not turn the function selector switch with test leads connected to the instrument.
- Do not install substitute parts or make any modification to the instrument.
- Do not try to replace the batteries if the surface of the instrument is wet.
- Make sure to disconnect test leads from the device under test when opening the case for battery replacement.

⚠ CAUTION
- Always make sure to check Function switch is setting to the appropriate range before starting measurement.
- Do not expose the instrument to the direct sun, high temperature and humidity or dewfall.
- When the instrument will note be in use for a long period, place it in storage after removing the batteries.
- Use a cloth dipped in water or neutral detergent for cleaning the instrument. Do not use abrasives or solvents.

Please refer to following explanation of the symbols marked on the instrument or in the manual.
- Symbols

⏚ : Ground ～ : AC ⎓ : DC
≂ : AC and DC Ω : Resistance
⊣◂ : Diode ◂·)) : Buzzer
⊣⊢ : Capacitor Hz : Frequency
⊡ : Double or reinforced insulation

- Measurement

CAT Ⅱ : Primary electrical circuit of equipment with power cord for connection to outlet.
CAT Ⅲ : Primary electrical circuit of the equipment, which is supplied power from a distribution board, and cable run from a distribution board to an outlet.

2. Features

This is a Digital Multi Meter providing most portability by means of stowing the instrument body together with probe in the notebook-size cover.
- Designed to international safety standards.
  IEC 61010-1 Measurement CAT. Ⅲ 300V
  Pollution degree 2
  IEC 61010-031 (probe assemblies)
- REL function to check the difference of measured values
- Auto power off function to save battery consumption
- Data hold function
- Diode and Continuity check function
- Auto-ranging function
- Frequency measurement function
- DUTY measurement function
  (Express Pulse width / Pulse period as a percentage)

3. Specification

- Measuring ranges and accuracy
  (23±5℃, under the 45%～75%RH)

DCV Function(5 Autoranging) :Input impedance approx. 10MΩ

Range	Measuring range	Accuracy
400mV	0～600V	±0.8%rdg±5dgt
4V		
40V		
400V		
600V		±1.0%rdg±5dgt

ACV Function(4 Autoranging): Input impedance approx. 10MΩ

Range	Measuring range	Accuracy
4V	0～600V	±1.3%rdg±5dgt (50 / 60Hz)
40V		±1.7%rdg±5dgt (～400Hz)
400V		±1.6%rdg±5dgt (50 / 60Hz)
600V		±2.0%rdg±5dgt (～400Hz)

Resistance Function(6 Autoranging)

Range	Measuring range	Accuracy
400Ω	0～40MΩ	±1.0%rdg±5dgt
4kΩ		
40kΩ		
400kΩ		
4MΩ		
40MΩ		±2.5%rdg±5dgt

Diode check/Continuity check Function

Function	Measuring range
Diode check	Test current approx. 0.4mA
Continuity check	Buzzer beeps below about 120Ω

Capacity Function (6 Autoranging)

Range	Measuring range	Accuracy
4nF	～200uF	±5.5%rdg±10dgt
40nF		±3.5%rdg±10dgt
400nF		±3.5%rdg±5dgt
4uF		
40uF		
200uF		±4.5%rdg±5dgt

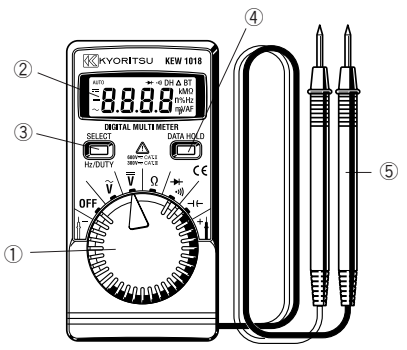
Frequency (6 Autoranging)/ DUTY Function

Range	Measuring range	Accuracy
10Hz	～200kHz Input sensitivity: more than 1.5V(RMS)	±0.1%rdg±5dgt
100Hz		
1000Hz		
10kHz		
100kHz		
200kHz		
DUTY	0.1～99.9% (Pulse width / Pulse period)	±2.5%rdg±5dgt

Note:
*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.
- **Standards :**
  IEC61010-1 Measurement CAT Ⅲ 300V, pollution degree 2
  Measurement CAT Ⅱ 600V, pollution degree 2
  IEC61010-031
  IEC61326
- **Method of operation :** △Σ method
- **Indication:**
  LCD maximum value 3999 (ACV, DCV, Ω, F)
  units, symbols
- **Over range display :**
  "OL" symbol is displayed on the LCD.
  In case that the value is beyond effective measuring range at the position of Ω function range and manual range.
- **Auto-ranging :**
  Range shifts to upper range when indicated value is more than 3999. Range shifts to lower range when indicated value is less than 360.
- **Sampling rate :** approx. 400ms
- **Operating Environmental conditions**
  —indoor use
  —altitude up to 2000m
- **Temperature & Humidity range(guaranteed accuracy):**
  23℃±5℃ Relative humidity: less than 75%
- **Operating Temperature & Humidity range:**
  0℃～+40℃ Relative humidity: less than 80%
- **Storage Temperature & Humidity range:**
  -20℃～+60℃ Relative humidity: less than 70%
- **Insulation Resistance:**
  It should be more than 10MΩ/DC1000V between electrical circuit and enclosures.
- **Withstand Voltage :**
  It should be more than AC3700V/ for one minute between electrical circuit and enclosures.
- **Overload Protection :**
  Voltage function : 720V(RMS.) 10seconds
  Resistance function : 250V(RMS.) 10seconds
  Diode / Continuity : 250V(RMS.) 10seconds
  Capacity function : 250V(RMS.) 10seconds
  Frequency function : 250V(RMS.) 10seconds
- **Dimensions :** approx. 107(L) x 54(W) x 10(D) mm
- **Weight :** approx. 70g(including batteries)
- **Power source :** Two LR44(SR44)1.5V or equivalent
- **Accessories :** Two LR44 (SR44) batteries
  Portable holder
  Instruction manual

⚠ CAUTION
The voltage shown above is the overload protection (overvoltage protection) for the instrument.
Make sure not to exceed the value of voltage shown above.

4. Instrument Layout



① Function Selector Switch
② Display
③ SELECT Key
④DATA HOLD Key
⑤Test Leads

5. Preparation

5-1 Checking Battery Voltage
Set the Function Selector Switch to other positions except the OFF position.
Battery Voltage is enough if indication is clear and BT symbol is not indicated in this bout.
If BT symbol is indicated or no indication on the display, follow to the Battery Replacement procedures shown in item9 in this document and replace with new batteries.

6. Measurements

6-1 Voltage Measurement (DCV, ACV)

⚠ DANGER
- To avoid the danger of getting electrical shock, never make measurement on a circuit over 600V AC/DC. (electrical potential to ground 300V AC/DC)
- Do not operate Function Selector Switch during measurement.
- Do not make measurement when opening the instrument case.

6-1-1 DC Voltage Measurement (DCV)
(1) Set the Function Selector Switch to " V̄ " position.
(Then, "AUTO"," ⎓ "and"mV" symbols are indicated on the display.)
(2) Connect the black test lead to the negative side of the circuit under the test and the red test lead to the positive side of the circuit, then the measured value is indicated on the display. If you connect the test leads the other way, "−" symbol is indicated on the display.

6-1-2 AC Voltage Measurement (ACV)
(1) Set the Function Selector Switch to " Ṽ " position.
(Then, "AUTO", " ～ ", and "V" symbols are indicated on the display.)
(2) Connect the test leads to the circuit under test.
Measured value is indicated on the display.
Note) Even if short-circuit the input line at the range of AC4V, 2～5dgt may remain indicated.

6-2 Resistance Measurement

⚠ DANGER
- To avoid the danger of getting electrical shock, never make measurement of the circuit in which electric potential exists.
- Do not make measurement when opening the instrument case.

(1) Set the Function Selector Switch to "Ω" position.
(Then, "AUTO" and "MΩ" symbols are indicated on the display.) Make sure that the "OL" symbol is indicated on the display at this bout, then short the test lead tips and check "0" is indicated on the display.
(2) Connect the test leads to both ends of the resistance under test.
Measured value is indicated on the display.
Note) Even if short the test lead tips, indicated value may not be "0". But this is because of the resistance of test leads and not a failure.

6-3 Continuity Check/ Diode Check

⚠ DANGER
- To avoid the danger of getting electrical shock, never make measurement of the circuit in which electric potential exists.
- Do not make measurement when opening the instrument case.

6-3-1 Continuity Check
(1) Set the Function Selector Switch to "⊣◂/·)) " position.
(Then, " ·)) " and Ω symbols are indicated on the display.)
(2) Make sure that the "OL" symbol is indicated on the display at this bout, then short the test lead tips and check "0" is indicated on the display and check if the buzzer beeps.
(3) Connect the test leads to both ends of the resistance under test.
Measured value is indicated on the display. The buzzer beeps below about 120Ω.
Note) Even if short the test lead tips, indicated value may not be "0". But this is because of the resistance of test leads and not a failure.

6-3-2 Diode Check
(1) Set the Function Selector Switch to " ⊣◂/·)) " position.
(Then, " ·)) " and "Ω" symbols are indicated on the display.)
(2) Press the SELECT Key twice and set the instrument to Diode Check mode. (Then, " ⊣◂ " and "V" symbols are indicated on the display.) Make sure that the "OL" symbol is indicated on the display at this bout, then short the test lead tips and check "0" is indicated on the display.
(3) Connect the black test lead to the cathode side of the Diode and the red test lead to the anode side of the Diode.
Forward voltage of Diode is indicated on the display.
(4) Connect the black test lead to the anode side of the Diode and the red test lead to the cathode side of the Diode.Normally, "OL" symbol is indicated on the display.
Conclusion : Diode is OK if the instrument complies with above items(3) and (4).
Note) Open-circuit voltage between measuring terminals is approx.1.5V.(measuring current approx. 0.4mA)

6-4 Capacitance Measurement

⚠ DANGER
- To avoid the danger of getting electrical shock, never make measurement of the circuit in which electric potential exists.
- Do not make measurement when opening the instrument case.
- Make sure to discharge the capacitor before making measurement.

(1) Set the Function Selector Switch to "⊣⊢" position.
(Then, "AUTO" and "nF" symbols are indicated on the display.)
(2) Press the SELECT key and "0" shall be indicated.
(Then, "△" symbol is indicated on the display.)
(3) Connect the test leads to both ends of the resistance under test.
Measured value is indicated on the display.
Measuring unit "nF" / "uF" is automatically chosen and indicated due to the measured value.
Note) It may take some time according to the measuring capacitance.
Measuring capacitance < 4uF Measuring time is about 2seconds
Measuring capacitance < 40uF Measuring time is about 7seconds
Measuring capacitance < 100uF Measuring time is about 15seconds

6-5 Frequency Measurement

⚠ DANGER
- To avoid the danger of getting electrical shocks, never make measurement on a circuit over 300V AC/DC. (electrical potential to ground 300V AC/DC)
- Do not operate Function Selector Switch during measurement.
- Do not make measurement when opening the instrument case.

Frequency can be measured at ACV functions by pressing "Hz/DUTY" Switch. Concerning with the direction for use of "Hz/ DUTY" Switch, please reference to the item7-1 Hz/DUTY in this document.
Note) The minimum input can be measured is approx. 1.5V.

7. How to use Function Switches

7-1 SELECT, Hz/DUTY Key

At each function, the actions of SELECT, Hz/DUTY key are different so please refer to following items and make active use of them.
- ACV function
  (Above two keys act as Hz/DUTY switch key.)
  Capable of selecting the Voltage, Frequency or DUTY measurement mode.
  At the initial condition, Voltage measurement has been selected for the ACV function.
  By pressing "Hz/DUTY" key, measuring mode changes.
  "Voltage" → "Frequency" → "DUTY"

- DCV, Ω and Capacitance measurement
  (Above two keys act as REL△ key.)
  Indicate the difference between measured values.
  When any function ("DCV", "Ω" and "Capacitance") selected, the measured value can be stored by pressing SELECT key and after that, the difference between stored value and measuring value is indicated on the display
  (△mark is keep lighting on the display while a value is stored)
  The stored value can be released by pressing "SELECT" key again.
  "Release" → "Memory"

- Continuity check /Diode check function
  (Change between Continuity check and Diode check)
  At the initial condition, "Continuity check" mode has been selected for the Continuity check / Diode check function.
  By pressing "SELECT" key, measuring mode changes.
  "Continuity check" → "Diode check"
  The relative measurement is allowed in the following range.
  *Measuring range = Full scale value at a range − initial value

7-2 DATA HOLD Key

The measured value can be hold at all functions.
By pressing "DATA HOLD" key, "DH" symbol indicated on the display and the indicated value can be held.
By pressing "DATA HOLD" key again, "DH" symbol disappears from the display and held data is released.

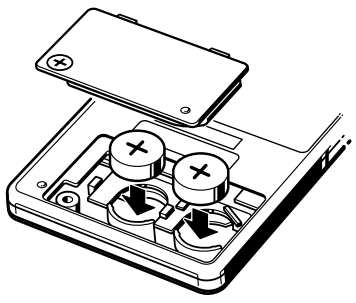
8. Auto Power Off

Auto power off function operates when about 15minutes passed after power on this instrument. When Auto power off function operates and the instrument powered off, the power-off statue returns to normal by pressing any key.

9. Battery Replacement

⚠ DANGER
- Never open the instrument case when making measurement.
- To avoid getting electrical shock, be sure to remove test leads from the instrument when opening the instrument case in order to replace batteries.

(1) Remove the Portable holder from the instrument.
(2) Loosen one screw on the bottom of the instrument and open the battery cover, then replace batteries.
Battery : Two LR44(SR44)1.5V or equivalent



10. Maintenance

Use a cloth dipped in water or neutral detergent for cleaning the instrument. Do not use abrasives or solvents.

DISTRIBUTOR

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