

Table of Contents

Title	Page
Overview	3
Unpacking Inspection	4
Safety Information	5
Rules For Safe Operation	6
International Electrical Symbols	8
The Meter Structure	8
Rotary Switch	9
Functional Buttons	10
Display Symbols	12
Measurement Ranges	14
A. Selecting a Measurement Range	14
B. Manual Ranging and Autoranging	14
Measurement Operation	16
A. AC Voltage Measurement	16
B. DC Voltage Measurement	17
C. DC Millivolt Measurement	18
D. Measuring Resistance / Conductance, Capacitance and Continuity	19
E. Testing Diodes	23
F. DC or AC Current Measurement	24
G. Frequency & Duty Cycle Measurement	26
MAX/MIN Recording Mode	29
PEAK MAX/MIN Mode	31
Operation of Hold Mode	32
Operation of Auto Hold Mode	32
The Use of Relative Value and Relative Percentage Value Mode	33
Turning on the Display Backlight	34
Analogue Bar Graph Display	34
Sleep Mode	35
General Specifications	36

Title	Page
Accuracy Specifications	37
A. AC Voltage	37
B. DC Voltage	37
C. Continuity, Resistance & Conductance Test	38
D. Capacitance	38
E. Diodes Test	38
F. DC Current	39
G. AC Current	39
H. Frequency & Duty Cycle	40
Maintenance	42
A. General Service	42
B. Testing the Fuses	43
C. Replacing the Battery	44
D. Replacing the Fuses	45
RS232C Serial Port	46
A. RS232C Port Cable	46
B. Setting of RS232C Serial Ports	46
C. System Requirements for Installing the UT70D Interface Program	47

Overview

This Operating Manual covers information on safety and cautions. Please read the relevant information carefully and observe all the **Warnings** and **Notes** strictly.



Warning

To avoid electric shock or personal injury, read the "Safety Information" and "Rules for Safe Operation" carefully before using the Meter.

Your Multimeter is an intelligent digital one, a precise instrument with a resolution of 80,000 counts and up-to-date automatic computer calibrating function. High resolution A/D converter and micro-controller data processing technique is adopted in the Meter, featured with intelligence, high precision and multi-functions. The Meter can be widely used in laboratory field service, domestic and other applications. All the functions and ranges have full overload protection.

In addition to the conventional measuring functions, it is equipped with a RS232C standard serial port for easy connection with computer to realize macro recording and monitoring and capture of transient dynamic data, displaying change of waveform during the measurement, providing data and evidence to engineering technicians for scientific research. This is also a highly applied digital multimeter of good performance with display backlight.

Unpacking Inspection

Open the package case and take out the Meter. Check the following items carefully to see any missing or damaged part:

Item	Description	Qty
1	English Operating Manual	1 piece
2	Test Lead	1 pair
3	Test Clip	1 piece
4	9V Battery (NEDA 1604,6F22 or 006P) (installed)	1 piece
5	RS232C Interface Cable	1 piece
6	CD-ROM (Installation Guide & Computer Interface Software)	1 piece
7	Holster	1 piece
8	Tilt Stand	1 piece

In the event you find any missing or damage, please contact your dealer immediately.

Safety Information

CE Version: The Meter complies with the standards IEC61010-1:in pollution degree 2, overvoltage category CAT III 1000V, CAT IV 600V and double insulation .

UL Version: The Meter complies with the standards UL61010B-1, in pollution degree 2, overvoltage category CAT II 1000V and double insulation.

CAT. II: Local level, appliance, PORTABLE EQUIPMENT etc., with smaller transient voltage overvoltages than CAT. III

CAT. III: Distribution level, fixed installation, with smaller transient overvoltages than CAT. IV

CAT IV: Primary supply level, overhead lines, cablesystems etc.

Use the Meter only as specified in this operating manual, otherwise the protection provided by the Meter may be impaired.

In this manual, a Warning identifies conditions and actions that pose hazards to the user, or may damage the Meter or the equipment under test.

A Note identifies the information that user should pay attention on.

International electrical symbols used on the Meter and in this Operating Manual are explained on page 8

Rules For Safe Operation(1)

Warning













To avoid possible electric shock or personal injury, and to avoid possible damage to the Meter or to the equipment under test, adhere to the following rules:

- Before using the Meter inspect the case. Do not use the Meter if it is damaged or the case (or part of the case) is removed. Look for cracks or missing plastic. Pay attention to the insulation around the connectors.
- Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads with identical model number or electrical specifications before using the Meter.
- Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and grounding.
- The rotary switch should be placed in the right position and no any changeover of range shall be made during measurement is conducted to prevent damage of the Meter.
- Never working at an effective voltage over 60V in DC or 30V rms in AC for there is danger of electric shock.
- Use the proper terminals, function, and range for your measurements.
- Do not use or store the Meter in an environment of high temperature, humidity, explosive, inflammable and strong magnetic field. The performance of the Meter may deteriorate after dampened.
- When using the test leads, keep your fingers behind the finger guards.
- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes, current or capacitance.

Rules For Safe Operation(2)

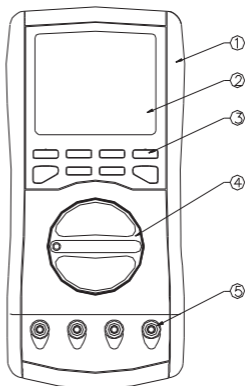
- Before measuring current, check the Meter's fuses and turn off power to the circuit before connecting the Meter to the circuit.
- Replace the battery as soon as the battery indicator appears. With a low battery, the Meter might produce false readings that can lead to electric shock and personal injury.
- Remove test leads and RS232C interface cable from the Meter and turn the Meter power off before opening the Meter case.
- When servicing the Meter, use only the same model number or identical electrical specifications replacement parts.
- The internal circuit of the Meter shall not be altered at will to avoid damage of the Meter and any accident.
- Soft cloth and mild detergent should be used to clean the surface of the Meter when servicing. No abrasive and solvent should be used to prevent the surface of the Meter from corrosion, damage and accident.
- The Meter is suitable for indoor use.
- Turn the Meter off when it is not in use and take out the battery when not using for a long time.
- Constantly check the battery as it may leak when it has been using for some time, replace the battery as soon as leaking appears. A leaking battery will damage the Meter.

International Electrical Symbols

	AC (Alternating Current).
	DC (Direct Current).
	AC or DC.
	Grounding.
	Double Insulated.
	Warning. Refer to the Operating Manual.
	Deficiency of Built-In Battery.
	Continuity Test.
	Diode.
	Capacitance Test.
	Fuse.
	Conforms to Standards of European Union.

The Meter Structure (see figure 1)












- ① Front Case
- ② LCD Display
- ③ Functional Buttons
- ④ Rotary Switch
- ⑤ Input Terminals



(figure 1)

Rotary Switch

Below table indicated for information about the rotary switch positions.








Rotary Switch Position	Function
OFF	Power is turned off.
V 	AC voltage measurement.
V 	DC voltage measurement.
mV 	DC millivolt measurement.
  	 : Continuity measurement.
	Ω : Resistance measurement.
	 : Capacitance measurement.
	Diode measurement.
A 	AC or DC current measurement range from 0.1mA to 10.000A.
mA 	AC or DC current measurement range from 0.001mA to 800.00mA.

Functional Buttons(1)

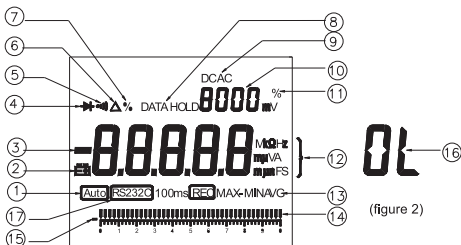
Below table indicated for information about the functional button operations.

Button	Function	Operation Performed	LCD Symbol
·))	Continuity Test	Turn the continuity buzzer on and off in the Resistance measurement mode.	·))
	Power-Up Option	Press ·)) while turning on the Meter to disable the beeper of pressing any button.	
	Measure Peak Min Max	To toggle between 100ms response time and 1ms response time under REC mode except resistance and capacitance range.	100ms [REC] MAX MIN
MAX/ MIN	REC Mode	Starts recording of maximum and minimum values. Steps the display through the sequence of present, high(MAX), low(MIN) and average(AVG) readings at any mode except at conductance mode. In 1ms response time, it steps through only MAX and MIN reading.	100ms [REC] MAX MIN AVG
	Power-Up Option	To select 1 second high accuracy response time, press and hold down MAX/MIN while turning the rotary switch to any function setting.	
RANGE	Manual range /auto-range options	<ul style="list-style-type: none"> ● Press RANGE to toggle between manual ranging and auto ranging mode at any rotary switch position. ● Press RANGE to step through the ranges available for the selected function. 	[Auto]
	Others	Press RANGE while turning on the power to enter 80,000 counts resolution except at capacitance measurement.	

Functional Buttons(2)




Button	Function	Operation Performed	LCD Symbol
HOLD	Data holding	Press HOLD down to enter the Auto Hold mode at any mode.t	DATA HOLD
	Others	Press HOLD to switch between resistance and conductance value at conductance or resistance measuring mode.	nS M Ω
	Selecting capacitance and DC/AC	<ul style="list-style-type: none"> ● Press  to select capacitance test at Ω  measurement position. ● Press  to select AC/DC mode at current measurement position. 	nF μ F DCAC
	Power-Up Option	Press  when turning on the Meter to disable Sleep Mode function.	
REL Δ	Relative value measurement	Press REL Δ to enter or exit Δ mode at any rotary switch position.	Δ
	Relative percentage value measurement	Press REL Δ to enter or exit Δ % mode at any rotary switch position.	Δ %
Hz	Frequency measurement	Press Hz once to enter frequency measurement in AC/DC voltage or current measurement positions.	Hz %
	Duty cycle measurement	Press Hz twice to enter duty cycle measurement in AC/DC voltage or current measurement positions.	
	Display Backlight	Press  once to turn the Display Backlight on and it shall shut off automatically in around 60 seconds later.	

Display Symbols(1) (see figure 2)



No.	Symbol	Meaning
①	Auto	The Meter is in the auto range mode in which the Meter automatically selects the range with the best resolution.
②		The battery is low. ⚠ Warning: To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator appears.
③	—	Indicates negative reading.
④		Test of diode.
⑤		The continuity buzzer is on.
⑥		The relative value mode is on, which display the present value minus the stored value.
⑦		The relative percentage is on, which displays the percentage of the $\Delta\%$ and the stored value.
⑧	DATA HOLD	Data hold is active.
⑨	DC AC	Indicator for DC/AC voltage or current. The displayed value is the mean value.
⑩	8000mV	Display the present chosen range.
⑪	%	Percent, used for duty cycle measurements.

Display Symbols (2)

⑫	MkΩ	Ω: kΩ: MΩ:	Ohm. The unit of resistance. kilohm. 1×10^3 or 1000 ohms. Megohm. 1×10^6 or 1,000,000 ohms.
	Mk Hz	Hz: kHz: MHz:	Hertz. The unit of frequency. Kilohertz. 1×10^3 or 1000 hertz. Megahertz. 1×10^6 or 1,000,000 hertz.
	mV	V: mV:	Volts. The unit of voltage. Millivolt. 1×10^{-3} or 0.001 volts.
	mA	A: mA:	Amperes (amps). The unit of current. Milliamp. 1×10^{-3} or 0.001 amperes.
	μnF	F: μF: nF:	Farad. The unit of capacitance. Microfarad. 1×10^{-6} or 0.000001 farads. Nanofarad. 1×10^{-9} or 0.000000001 farads.
	nS	S: nS:	Siemens. The unit of conductance. Nanosiemens. 1×10^{-9} or 0.000000001 siemens.
⑬		Maximum, minimum and average recording mode enabled. Present reading displayed.	
	100ms	100ms response time.	
	MAX	Maximum reading displayed.	
	MIN	Minimum reading displayed.	
	AVG	Average reading displayed.	
⑭	Analogue Bar Graph	Provides an analogue indication of the present input, quick response.	
⑮		Polarity indicator for the analogue bar graph display, no display for positive.	
⑯	OL	The input value is too large for the selected range.	
⑰		Computer and the Meter is connected properly. Data output is in progress.	

Measurement Ranges(1)

A measurement range determine the highest value the Meter can measure. Most Meter functions have more than one range. See "Accuracy Specifications".

A. Selecting a Measurement Range

Being in the right measurement range is important:

- If the range is too low for the input, the Meter displays **OL** to indicate an overload.
- If the range is too high, the Meter will not display the most accurate measurement.

B. Manual Ranging and Autoranging

The Meter has both manual range and autorange options:

- In the autorange mode, the Meter selects the best range for the input detected. This allows you to switch test points without having to reset the range.
- In the manual range mode, you select the range. This allows you to override autorange and lock the Meter in a specific range.

The Meter defaults to the autorange mode in measurement functions that have more than one range. When the Meter is in the autorange mode, **AUTO** is displayed.

To enter or exit the manual range mode:

Measurement Ranges(2)

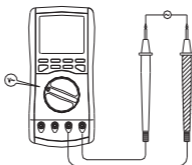
1. Press **RANGE**.
The Meter enters the manual range mode and **AUTO** turns off.
Each presses of **RANGE** increments the range.
When the highest range is reached, the Meter wraps to the lowest range.
2. To exit the manual range mode, press and hold **RANGE** for over 1 seconds.
The Meter returns to the autorange mode and **AUTO** is displayed.

Note

- In Hold, Max/Min mode, Press **RANGE** exits these measurement modes and enters manual range mode.
- In Hz measurement mode, Press **RANGE** to attenuate 10 times of input signal amplitude which can increase the Meter sensitivity and stabilize the correct reading.
- Press **RANGE** while turning on the power to enter 80,000 counts resolution except at capacitance measurement.

Measurement Operation (1)

A. AC Voltage Measurement (see figure 3)



(figure 3)

Warning

To avoid harms to you or damages to the Meter from electric shock, please do not attempt to measure voltages higher than 1000V though the readings may be obtained.

The AC Voltage ranges are: 800.0mV, 8.000V, 80.00V, 800.0V and 1000V. To measure AC Voltage, connect the Meter as follows:

1. Insert the red test lead into the **VΩHz** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to **V~**.
3. Connect the test leads across with the object being measured.

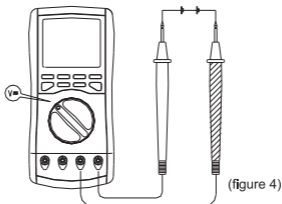
The measured value shows on the display, which is effective value of sine wave (mean value response).

Note

- In each range, the Meter has an input impedance of 10MΩ. This loading effect can cause measurement errors in high impedance circuits. If the circuit impedance is less than or equal to 10kΩ, the error is negligible (0.1% or less).
- When AC voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test, and remove the testing leads away from the input terminals of the Meter.

Measurement Operation (2)

B. DC Voltage Measurement (see figure 4)



Warning

To avoid harms to you or damages to the Meter from electric shock, please do not attempt to measure voltages higher than 1000V though the reading may be obtained.

The DC voltage ranges are: 8.0000V, 80.000V, 800.00V and 1000.0V. To measure DC Voltage, connect the Meter as follows:

1. Insert the red test lead into the **VΩHz** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to **V**
3. Connect the test leads across with the object being measured.

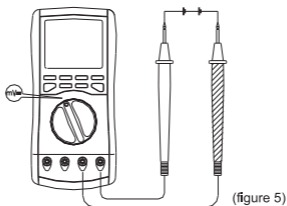
The measured value shows on the display.

Note

- In each range, the Meter has an input impedance of $10\text{M}\Omega$. This loading effect can cause measurement errors in high impedance circuits. If the circuit impedance is less than or equal to $10\text{k}\Omega$, the error is negligible (0.1% or less).
- When DC voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test, and remove the testing leads away from the input terminals of the Meter.

Measurement Operation (3)

C. DC Millivolt Measurement (see figure 5)



Warning

To avoid harms to you or damages to the Meter from electric shock, please do not attempt to measure voltages higher than 1000V though the reading may be obtained.

The DC Millivolt ranges are: 80.000mV, 800.00mV. To measure DC Voltage, connect the Meter as follows:

1. Insert the red test lead into the **VΩHz** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to **mV**.
3. Connect the test leads across with the object being measured.

The measured value shows on the display.

Note

- In this range, the Meter has an input impedance higher than 4000M Ω
- When DC mV voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test, and remove the testing leads away from the input terminals of the Meter.

Measurement Operation (4)

D. Measuring Resistance / Conductance, Capacitance & Continuity

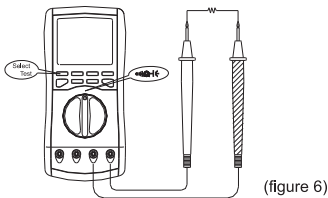


Warning

To avoid damages to the Meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before measuring resistance, capacitance & continuity. Use the DC voltage function to confirm that the capacitor is discharged.

Resistance / Conductance Measurement

(see figure 6)



(figure 6)

The resistance ranges are: 800.00 Ω , 8.0000k Ω , 80.000k Ω , 800.00k Ω , 8.0000M Ω , 80.000M Ω . To measure the resistance, Conductance, connect the Meter as follows:

1. Insert the red test lead into the **VΩHz** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to **VΩHz** ; resistance measurement is default.
3. Connect the test leads across with the object being measured. The measured value shows on the display.

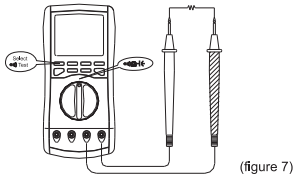
Measurement Operation (5)

Note

- The test leads can add 0.1Ω to 0.2Ω of error to resistance measurement. To obtain precision readings in low-resistance measurement, that is the range of 800.00Ω , short-circuit the input terminals beforehand, using the relative measurement function button **REL** to automatically subtract the value measured when the testing leads are short-circuit from the reading.
- For high-resistance (higher than $1M \Omega$), it is normal that it will take several seconds to obtain a stable reading.
- When measure resistance higher than $12.5M \Omega$, conductance value can be displayed by pressing **HOLD**. To switch to resistance value, press **HOLD** again.
- Although it is possible to select frequency and duty cycle measurement mode, these functions cannot be used.
- Although it is possible to select frequency and duty cycle measurement mode, these functions cannot be used.
- When the resistance or conductance test has been completed, disconnect the connection between the testing leads and the circuit under test, and remove the testing leads away from the input terminals of the Meter.

Measurement Operation (6)

Continuity Measurement (see figure 7)

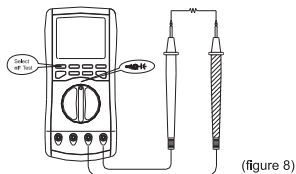


To measure the continuity, connect the Meter as follows:

1. Insert the red test lead into the **VΩHz** terminal and the black test lead into the **COM** terminal.
 2. Set the rotary switch to **Ω** and press **SELECT** to select **Ω** measurement mode.
 3. The buzzer sounds if the resistance of a circuit under test is less than $100\ \Omega$.
- The **LCD** displays **OL** indicating the circuit being tested is open.
 - Press **SELECT** while turning on the Meter to disable the beeper of pressing any button.
 - Although it is possible to select frequency and duty cycle measurement mode, these functions cannot be used.
 - When continuity testing has been completed, disconnect the connection between the testing leads and the circuit under test. and remove the testing leads away from the input terminals of the Meter.

Measurement Operation (7)

Capacitance Measurement (see figure 8)



The Meter's capacitance ranges are: 1.000nF, 10.00nF, 100.0nF, 1.000 μ F, 10.00 μ F, and 100.0 μ F. To measure capacitance, connect the Meter as follows:

1. Insert the red test lead into the **V Ω Hz** terminal and the black test lead or test clip into the **COM** terminal.
2. Set the rotary switch to **|||** and press **SELECT** button to select capacitance measurement mode..
3. Connect the test leads or the test clips across with the object being measured.

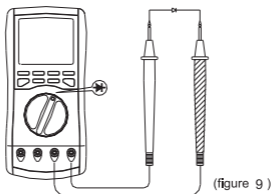
The measured value shows on the display.

Note

- For testing the capacitor with polarity, connect the red test lead to anode & black test lead to cathode.
- When capacitance testing has been completed, disconnect the connection between the testing leads and the circuit under test, and remove the testing leads away from the input terminals of the Meter.

Measurement Operation (8)

E. Testing Diodes (see figure 9)



Warning

To avoid damages to the Meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before measuring diodes.

Use the diode test to check diodes, transistors, and other semiconductor devices. The diode test sends a current through the semiconductor junction, then measures the voltage drop across the junction. A good silicon junction drops between 0.5V and 0.8V.

To test a diode out of a circuit, connect the Meter as follows:

1. Insert the red test lead into the **VΩHz** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to **→|←**.
3. For forward voltage drop readings on any semiconductor component, place the **VΩHz** terminal (red test lead) to anode & **COM** terminal (black test lead) to cathode.
The measured value shows on the display.

Note

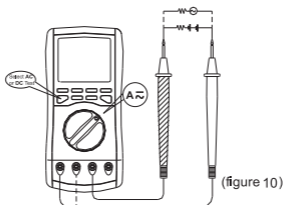
- In a circuit, a good diode should still produce a forward voltage drop reading of 0.5V to 0.8V; however, the reverse voltage drop reading can vary

Measurement Operation (9)

depending on the resistance of other pathways between the probe tips.

- Connect the test leads to the proper terminals as said above to avoid error display.
- The **LCD** will display ∞ indicating open-circuit for wrong polarity connection.
- The unit of diode is Volt (V), displaying the positive -connection voltage-drop value.
- Although it is possible to select frequency and duty cycle measurement mode, these functions cannot be used.
- When diode testing has been completed, disconnect the connection between the testing leads and the circuit under test.

F. DC or AC Current Measurement (see figure 10)



Warning

Never attempt an in-circuit current measurement where the open-circuit voltage between the circuit and ground is greater than 600V. If the fuse burns out during measurement, the Meter may be damaged or the operator himself may be hurt. Use proper terminals, function and range for the measurement. When the testing leads are connected to the current terminals, do not parallel them across any circuit.

Measurement Operation (10)

The current measurement has 2 measurement positions on the rotary switch: **A** and **mA** .

The **A** has a 8.0000A and 10.000A range, with autoranging; the **mA** has a 80.000mA and 800.00mA range, with auto ranging.

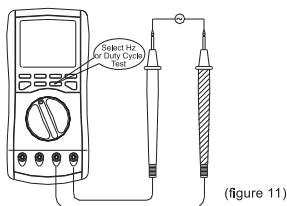
To measure current, connect the Meter as follows:

1. Turn off power to the circuit. Discharge all high-voltage capacitors.
2. Insert the red test lead into the **A** or **mA** terminal and the black test lead into the **COM** terminal. Use the **A** terminal and **A** range if the current value to be tested is an unknown.
3. Set the rotary switch to **A** or **mA** .
4. The Meter defaults to DC current measurement mode. To toggle between **DC** and **AC** current measurement function, press **⚡** .
5. Break the current path to be tested. Connect the red test lead to the more positive side of the break and the black test lead to the more negative side of the break.
6. Turn on power to the circuit.
The measured value shows on the display.
The AC current value displayed is a True RMS value.

Measurement Operation (11)

G. Frequency & Duty Cycle Measurement

(see figure 11)



(figure 11)

Frequency measurement

The measurement ranges are: **1kHz, 10kHz, 100kHz** and **1MHz**. The maximum measurement range is **1MHz**. To measure frequency, connect the Meter as follows:

1. Insert the red test lead into the Ω Hz terminal and the black test lead into the COM terminal.
2. Set the rotary switch to any measurement position of V_{\sim} , V_{\square} , mV_{\square} , A_{\sim} , mA_{\sim} .
3. Press the Hz button once to display the frequency of present signal while measure the AC voltage or current.
4. Connect the test leads across with the object being measured.

The measured value shows on the display.

Note

- Press the Hz button in the MAX/MIN, HOLD mode, it exits these modes.

Measurement Operation (12)

- The attenuate amplitude of signal is different from different measuring positions and ranges, therefore the required input amplitude is different when measuring frequency at different measuring positions and ranges.
- Although it is possible to select frequency and duty cycle measurement mode at resistance, continuity and diodes ranges, these functions cannot be used.
- It is recommended to use mV_{\sim} range which has the highest sensitivity.
- To obtain a stable reading when measuring input scope $> 30V$ rms frequency signal, set the rotary switch to V_{\sim} or V_{\sim} .
- When frequency measurement has been completed, disconnect the connection between the testing leads and the circuit under test, and remove the testing leads away from the input terminals of the Meter.

Duty Cycle Measurement

The duty cycle measurement range is 1% ~ 99%.

To measure duty cycle:

1. Set up the Meter to measure frequency.
2. To select duty cycle, press Hz again (or until the % symbol is shown on the display).
3. Connect the test leads across the object being measured. The measured value shows on the display.

Note

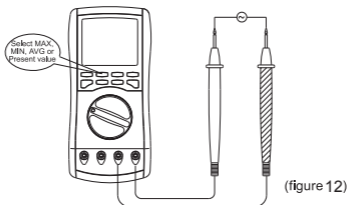
- Press the **Hz** button in the **MAX/MIN, HOLD** mode, it exits these modes.
- The attenuate amplitude of signal is different from different measuring positions and ranges, therefore the required input amplitude is different when

Measurement Operation (13)

measuring frequency at different measuring positions and ranges.

- Although it is possible to select frequency and duty cycle measurement mode at resistance, continuity and diodes ranges, these functions cannot be used.
- It is recommended to use DCV 8V range.
- The polarity of trigger slope is positive.
- When duty cycle measurement has been completed, disconnect the connection between the testing leads and the circuit under test, and remove the testing leads away from the input terminals of the Meter.

MAX MIN Recording Mode(1) (see figure 12)



MAX/MIN recording mode applied to all measurement function except at conductance measurement function.

MAX/MIN recording mode captures and stores the maximum and minimum input value detected, and calculates a running average of all readings taken.

In the **MAX/MIN** mode, when the Meter detects an input that is below the recorded minimum or above the recorded maximum, the Meter beeps and records the new minimum (**MIN**) or maximum (**MAX**) value.

In the **MAX/MIN** mode, you can also display a running average of all readings taken since the **MAX/MIN** mode was activated. Displaying the average reading allows you to "smooth" a rapidly changing input by displaying a stable reading on the digital display.

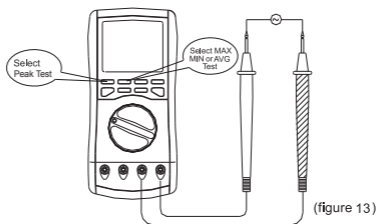
The **MAX/MIN** mode has a pre-set response time of 100ms. A shorter response time captures shorter events, but with decreased accuracy. If you want 1 second response time, that can be selected after power on the Meter.

To use the **MAX/MIN** mode as follows:

MAX MIN Recording Mode(2)

MAX MIN Function	Action
Enter the MAX/MIN mode	<ul style="list-style-type: none"> ● Make sure that the Meter is in the desired measurement function and range.
	<ul style="list-style-type: none"> ● Press MAX/MIN to enter MAX/MIN recording mode. The present reading is displayed, and the Meter is locked in the present range, and REC is displayed.
	<ul style="list-style-type: none"> ● Each time a new low or high value is recorded, the Meter beeps and displays a new reading.
	<ul style="list-style-type: none"> ● In MAX/MIN mode, Sleep Mode function will be disabled
To view the MAX , MIN , AVG or present reading	Press MAX/MIN to step through on the sequence of present readings, high (MAX), low (MIN) and average (AVG) readings.
To stop and resume recording without erasing stored value	Press HOLD to stop recording, the recorded values will not erase; Press HOLD again to resume recording.
To select response time	<ul style="list-style-type: none"> ● The pre-set response time is 100ms.
	<ul style="list-style-type: none"> ● Press ··) to select 1ms response time in MAX/MIN mode. In 1ms response time, it steps through on the sequence of MAX and MIN only.
	<ul style="list-style-type: none"> ● At the frequency measurement mode, it should be 1second response time.
	<ul style="list-style-type: none"> ● With the rotary switch in the OFF position, press and hold down MAX/MIN while turning on the rotary switch to select 1 second high accuracy response time..
To exit the MAX/MIN mode	Press MAX/MIN for over 1 second to exit the mode. Recorded values are erased and the Meter stays in the selected range.

PEAK MAX MIN Mode (see figure 13)



PEAK MAX MIN mode is an additional function of \curvearrowright . Pressing \curvearrowright to toggle between 100ms response time and 1ms response time. This function can only be enabled when the Meter is under **MAX/MIN, HOLD** mode.

To enter PEAK MAX MIN mode:

- Press \curvearrowright to enter **PEAK MAX MIN** mode (1ms response time), it steps through the sequence of **MAX** and **MIN** reading only.
- Press **HOLD** under 1ms recording mode to stop recording without erasing stored values. Press **HOLD** again to resume recording.

Operation of Hold Mode



Warning

To avoid possibility of electric shock, do not use **HOLD** mode to determine if circuits are without power. The **HOLD** mode will not capture unstable or noisy readings.

The **HOLD** mode is applicable to all measurement functions. With the Auto Hold function, it automatically holds the present reading on the display, freeing you to concentrate on the placement of the probes when working in dangerous or difficult situations.

Press **HOLD** to enter or exit the **HOLD** mode:

- Press **HOLD** to enter **HOLD** mode, the Meter beeps.
- Press **HOLD** again or **RANGE** or turn the rotary switch to exit **HOLD** mode, the Meter beeps.
- In **HOLD** mode, **DATA HOLD** is displayed on the **LCD**.
- When measure resistance higher than **12.5M** Ω , conductance value can be displayed by pressing **HOLD**. To switch to resistance value, press **HOLD** again.

Operation of Auto Hold Mode

Auto Hold means you no need to press **HOLD**, the readings on the LCD will be hold automatically.

Conditions to enter Auto Hold Mode:

- When input signal is larger than AC/DC 100mV, Auto Hold mode will be enabled automatically.
- When the change of signal three times continuously within ± 3 digits, it will hold the last value; the Meter beeps.
- Considers every value as the base value. When the Meter detects an input which is above the base value ± 300 digits, the Meter beeps, and holds and displays the value as the new base value.

The use of Relative Value and Relative Percentage Value Mode

The Δ and $\Delta\%$ mode applies to all measurement functions, with auto ranging. **REL** Δ mode can be used together with **AUTO-HOLD** and **MAX/MIN** mode.

The definition is as follows:

- Relative value (Δ) = present value - stored value.
For instance, if the stored value is 20.0V and the present value is 22.0V, the reading would be 2.0V. If a new measurement value is equal to the stored value then display 0.0V.
- Relative percentage value ($\Delta\%$) = (relative value Δ \div stored value) \times 100%

To enter or exit Δ and $\Delta\%$ mode:

- Use rotary switch to select the desired measurement function before selecting **REL** Δ . If measurement functions change manually after **REL** is selected, the Meter exits the **REL** Δ mode.
- Press **REL** Δ to enter Δ mode, and the present measurement range is locked and display the last measurement value as "0" as the stored value. Then if carrying out measurement at this time, the **LCD** will display the Δ value as the result.
- Press **REL** Δ again to enter $\Delta\%$ mode, and the present measurement range is locked and display the last measurement value as "0" as the stored value. Then if carrying out measurement at this time, the **LCD** will display the value as the $\Delta\%$ result.
- Press **REL** Δ again or turn the rotary switch to reset the stored value and exit Δ and $\Delta\%$ mode, returning to normal measurement mode.

Turning on the Display Backlight



Warning

In order to avoid the hazard arising from mistaken readings in insufficient light or poor vision, please use the Display Backlight function.

- Press \star to turn on the Display Backlight and it will automatically off after about 60 seconds.
- Press and hold \star for about 2 seconds to turn the Display Backlight off.

Analogue Bar Graph Display

The analogue bar graph likes the needle in a traditional analogue meter (AMM). It refreshes 50 times a sec, which is 10 times faster than that of digital display and is applied to zero adjustment and observation of rapidly changing signal that make digital display hard to read.


The analogue display is divided uniformly into 10 scales and composed of 41 segments; of which the full-range value corresponds to the full-range value of the measurement range that has been selected. The polarity of the measured value is displayed as "-" on the left of the analogue display: positive polarity is not displayed. For example, when 80V range is selected, the full-range value of the analogue display is 80V, and as the full range is uniformly divided into 10 grades, each grade denotes 8V; If the input is 40V, the high-lighted bar-shape will be at the position indicated by the number 5. if the input is -40V, a "-" sign will appear on the left of the analogue display.

There is no analogue displaying value when making measurement of frequency, diode, conductance and capacitance.




Full Icons Display

If the Meter is turned on with any functional button being pressed on, the LCD will display all the icons and maintain this mode until the button is released 3 seconds later.

Sleep Mode

- To preserve battery life, the Meter automatically turns off if you do not turn the rotary switch or press any button for about 30 minutes. The buzzer beeps three times 5 minutes before turning off.
- The Meter can be activated by turning the rotary switch or pressing any button.
If the Meter is activated by turning the rotary switch, it will start from the switch selected function.
- To disable the Sleep Mode, press  while turning on the Meter.
- In MAX MIN mode, the Sleep Mode is disabled.

General Specifications

- Maximum Voltage :1000V rms.
between $\sqrt{2}V_{\Omega Hz}$
Terminals and Grounding
-  Fused Protection :1A,250V fast type glass
for mA Input Terminal fuse, $\phi 5 \times 20$ mm.
-  Fused Protection :10A,250V fast type glass
for A Input Terminal fuse, $\phi 5 \times 20$ mm.
- Maximum Display :80000, updates 5 times
/second.
- Temperature :Operating: $5^{\circ}C \sim 40^{\circ}C$
($41^{\circ}F \sim 104^{\circ}F$).
Storage: $-10^{\circ}C \sim 50^{\circ}C$
($14^{\circ}F \sim 122^{\circ}F$).
- Relative Humidity :<80% @ $5^{\circ}C - 31^{\circ}C$;
<50% @ $31^{\circ}C - 40^{\circ}C$.
- Altitude :Operating: 2000 m.
Storage: 10000 m.
- Battery Type :One piece of 9V
NEDA1604 or 6F22 or
006P.
- Battery Deficiency :Display .
- Data Holding :Display **DATA HOLD**.
- Negative reading :Display **—**.
- Overloading :Display **OL**.
- Equipped with full icons display.
- Auto and manual range selectable.
- Dimensions (HxWxL) :195 x 90 x 39 mm.
- Weight :Approximate 550g (battery
included).
- Safety/Compliances :CE Version: IEC61010
CAT III 1000V, CAT IV 600V
overvoltage and double
insulation standard.
UL Version:UL 61010B-1,
CAT II 1000V overvoltage
double insulation standard.
- Certification : **CE /UL**
This meter is suitable for indoor use.

Accuracy Specifications (1)

Accuracy $\pm(a\% \text{ reading} + b \text{ digits})$ guarantee for 1 year.

Operating temperature $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$.

Relative humidity $< 80\%$.

A. AC Voltage

Range	Resolution	Accuracy		Overload Protection
		50 ~ 60Hz	40 ~ 50Hz 60 ~ 400Hz	
800.00mV	10 μV	$\pm(0.8\%+60)^*$	$\pm(1.5\%+60)^*$	1000V DC/AC rms continuous.
		$\pm(0.8\%+40)^{**}$	$\pm(1.5\%+40)^{**}$	
8.0000V	100 μV	$\pm(0.8\%+20)$	$\pm(1.5\%+20)$	
80.000V	1mV			
800.00V	10mV			
1000.0V	100mV			

Remarks:

- Input impedance $\geq 10\text{M}\Omega$.
- Displays True RMS value.
- Frequency response: 40 ~ 400Hz
- * When input signal $\geq 8\text{mV}$.
- ** When input signal $\geq 80\text{mv}$.

B. DC Voltage

Range	Resolution	Accuracy	Overload Protection
80.000mV	1 μV	$\pm(0.05\%+40)$	1000V DC/AC rms scontinuous.
800.00mV	10 μV	$\pm(0.05\%+20)$	
8.0000V	100 μV	$\pm(0.05\%+20)$	
80.000V	1mV	$\pm(0.05\%+10)$	
800.00V	10mV		
1000.0V	100mV		

Remarks:

- **At 80.00mV ~ 800.00mV Range:**
Input impedance $\geq 4000\text{M}\Omega$.
- **At 8.0000V ~ 1000.0V Range:**
Input impedance $\geq 10\text{M}\Omega$.

Accuracy Specifications (2)

C. Resistance, Conductance & Continuity Test

Range	Resolution	Accuracy	Overload Protection
800.00 Ω	0.01 Ω □	$\pm(0.3\%+60)$	600Vp
8.0000k Ω	0.1 Ω □	$\pm(0.3\%+40)$	
80.000k Ω	1 Ω □		
800.00k Ω	10 Ω □	□	
8.0000M Ω	100 Ω □	$\pm(0.5\%+20)$	
80.000M Ω	1k Ω □	$\pm(2\%+20)$	
80.000nS	0.001nS	$\pm(2\%+120)$	
Continuity Test	0.01 Ω	$\leq 100\Omega$	

Remarks:

- Continuity Test Range:
Buzzer beeps continuously.
Open circuit voltage approximate 0.7V.
- At 800.00 Ω ~ 80.000M Ω Range:
Open circuit voltage approximate 0.7V.
- Conductance Test (80.000nS):
80nS = 12.5M Ω

D. Capacitance

Range	Resolution	Accuracy	Overload Protection
1.000nF	1pF	At the REL mode $\pm(2\%+5)$	600Vp
10.00nF	10pF	$\pm(2\%+3)$	
100.0nF	100pF		
1.000 μ F	1nF		
10.00 μ F	10nF	$\pm(3\%+5)$	
100.0 μ F	100nF		

E. Diodes Test

Range	Resolution	Overload Protection
Diode	1mV	600 Vp

Accuracy Specifications (3)

Remarks:

- Open circuit voltage approximate 3V.
- Displays approximate forward voltage drop reading.

F. DC Current

Range	Resolution	Accuracy	Overload Protection
80.000mA	1μA	±(0.2%+40)	1A,250V fast type glass fuse,φ5x20mm.
800.00mA	10 μA		
8.0000A	100μA	±(0.3%+40)	10A,250V fast type glass fuse,φ5x20mm.
10.000A	1mA		

Remarks:

- At 8A & 10A Range:
For continuous measurement ≤ 10 seconds and interval time between 2 measurements greater than 15 minutes.

G. AC Current

Range	Resolution	Accuracy	Overload Protection
80.000mA	1μA	±(0.5%+40)	1A,250V fast type glass fuse,φ5x20mm.
800.00mA	10 μA		
8.0000A	100μA	±(0.8%+40)	10A,250V fast type glass fuse,φ5x20mm.
10.000A	1mA		

Remarks:

- At 8A & 10A Range:
For continuous measurement ≤10 seconds and interval time between 2 measurement greater than 15 minutes.

Accuracy Specifications (4)

- Frequency response **40Hz ~ 400Hz**.
- Displays True **RMS** value.

H. Frequency & Duty Cycle

Frequency - At mV_{\sim} Range

Range	Resolution	Accuracy	Overload Protection
1kHz	0.01Hz	$\pm(0.02\%+1)$	600Vp
10kHz	0.1Hz		
100kHz	1Hz		
1MHz	10Hz		

Remarks:

- Input sensitivity as follows:
 $<100kHz$: $\leq 200mV$ rms;
 $\geq 100kHz$: $\leq 600mV$ rms;
- Maximum input amplitude: 30V rms.

Frequency - At V_{\sim} & V_{\sim} Range

Range	Accuracy	Overload Protection
10Hz~100kHz	$\pm(0.1\%+3)$	600Vp

Remarks:

- Input amplitude: $\geq 600mV$ rms.
- Maximum input amplitude: 30V rms.

Frequency - At A_{\sim} & mA_{\sim} Range

Range	Accuracy	Overload Protection
50Hz ~ 10kHz	$\pm(0.1\%+3)$	1A,250V fast type glass fuse, $\phi 5 \times 20mm$.
		10A,250V fast type glass fuse, $\phi 5 \times 20mm$.

Remark:

- Input amplitude: ≥ 30000 digits.

Accuracy Specifications (5)

Duty Cycle

Range	Resolution	Overload Protection
Duty Cycle (1% ~ 99%)	0.01%	600Vp

Remarks:

- Reading is only for reference purpose.
- **At mV $\overline{\dots}$ 8V Range:**
Positive pulse width $\geq 30\mu\text{s}$.

MAINTENANCE(1)

This section provides basic maintenance information including battery and fuse replacement instruction.



Warning

Do not attempt to repair or service your Meter unless you are qualified to do so and have the relevant calibration, performance test, and service information. To avoid electrical shock or damage to the Meter, do not get water inside the case.

A. General Service

- Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.
- To clean the terminals with cotton bar with detergent, as dirt or moisture in the terminals can affect readings.
- Turn the Meter to **OFF** position when it is not in use and take out the battery when not using for a long time.
- Do not store the Meter in a place of humidity, high temperature and strong magnetic field.

MAINTENANCE(2)

B. Testing the Fuses



Warning

To avoid electrical shock or personal injury, remove the test leads and any input signals before replacing the battery or fuse.

To prevent damage or injury, install **ONLY** replacement fuses with identical amperage, voltage, and speed ratings.

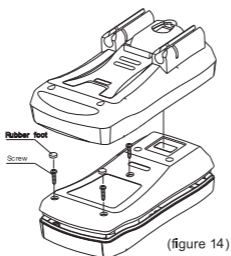
To test the fuse:

1. Set the rotary switch to Ω and select Ω by pressing \rightarrow .
2. Plug a test lead into the terminal $V\Omega Hz$ and touch the probe tip to the **10A** or **mA** terminal.
 - If the Meter beeps, the fuse is good.
 - If the display shows OL , replace the fuse and test again.
 - If the display shows any other value, have the Meter serviced and contact your dealer immediately.

If the Meter does not work while the fuse is all right, send it to your dealer for repair.

MAINTENANCE(3)

C. Replacing the Battery (see figure 14)



Warning

To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator "⊖⊕" appears.

To replace the battery:

1. Turn the Meter to **OFF** position and remove all connections from the terminals.
2. Take out the Meter from the holster.
3. Remove the 3 rubber feet and then 3 screws from the case bottom, and separate the case top from the case bottom.
4. Remove the battery from the battery connector.
5. Replace the battery with a new 9V battery (NEDA1604, 6F22 or 006P).
6. Rejoin the case bottom and case top, and reinstall the 3 screws and 3 rubber feet.

MAINTENANCE(4)

D. Replacing the Fuses (see figure 14)



Warning

To avoid electrical shock or arc blast, or personal injury or damage to the Meter, use specified fuses ONLY in accordance with the following procedure.

To replace the Meter's fuse:

1. Turn the Meter to **OFF** position and remove all connections from the terminals.
2. Take out the Meter from the holster.
3. Remove the 3 rubber feet and 3 screws from the case bottom, and separate the case top from the case bottom.
4. Remove the 4 screws fixing the PCB on the input terminals, gently take apart the PCB and reverse it.
5. Remove the fuse by gently prying one end loose, then take out the fuse from its bracket.
6. Install **ONLY** replacement fuses with the identical type and specification as follows and make sure the fuse is fixed firmly in the bracket.
Fuse1: 1A,250V fast type glass fuse, ϕ 5x20mm.
Fuse2: 10A,250V fast type glass fuse, ϕ 5x20mm.
7. Rejoin the PCB and the case top, and reinstall the 4 screws.
8. Rejoin the case bottom and case top, and reinstall the 3 screws and 3 rubber feet.

Replacement of the fuses is seldom required. Burning of a fuse always results from improper operation.

RS232C Serial Port (1)

A. RS232C Port Cable

The Meter	Computer			
	D-sub 9 Pin Female	D-sub 25 Pin Female	Pin Name	Remark
2	2	3	RX	Receiving Data
3	3	2	TX	Transmitting Data
4	4	20	DTR	Data Terminal Ready
5	5	7	GND	Grounding
6	6	6	DSR	Data Set Ready
7	7	4	RTS	Request to Send
8	8	5	CTS	Clear to Send

B. Setting of RS232C Serial Ports (see figure 15)

Default of RS232C serial port for communication is set as:

Baud Rate 9600

Start bit 1 (always 0)

Stop bit 1 (always 1)

Data bits 8

Parity None

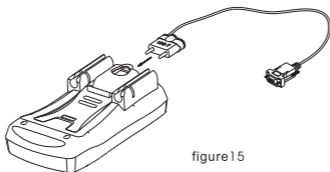


figure 15

RS232C Serial Port(2)

C System Requirements for Installing the UT70D Interface Program

To use **UT70D** Interface Program, you need the following hardware and software:

- An IBM PC or equivalent computer with 80586 or higher processor and 640 x 480 pixel or better monitor.
- Microsoft Windows 95 or above.
- At least 16MB of RAM.
- At least 8MB free space in hard drive.
- Can access to a local or a network CD-ROM.
- A free serial port.
- A mouse or other pointing device supported by Windows.

Please refer to the included "**Installation Guide & Computer Interface Software**" for installing and operating instructions of the **UT70DInterface Program**.

** END **

This operating manual is subject to change without notice.



Model UT70D: OPERATING MANUAL

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