Handheld Digital Multimeter

GDM-350B

USER MANUAL

GW INSTEK PART NO. 82DM-350B0M01

ISO-9001 CERTIFIED MANUFACTURER

Good Will Instrument Co., Ltd. No. 7-1, Jhongsing Rd., Tucheng Dist., New Taipei City 236, Taiwan.

Table of Contents

OVERVIEW 2
Unpacking & Inspection 3
Safety Information 4
International Electrical Symbols 6
Overall Specification 7
The Meter Structure 8
MEASUREMENT OPERATION 9
DC or AC Voltage Measurement 10
DC Current Measurement 12
Resistance Measurement 14
Diode Measurement 16
Continuity Measurement 18
Transistor hFE measurement 20
Temperature Measurement 22
ACCURACY SPECIFICATIONS 24
MAINTENANCE 30
General Service and Maintenance 30
Replacing the Battery and Fuse 31

OVERVIEW

The GDM-350B multimeter is a hand-held 3 1/2digit multimeter with an advanced design, multiple functions and reliable performance. This meter is fully capable of measuring both AC and DC voltage, DC current, resistance, temperature, the forward voltage drop of diodes, transistors, hFE and continuity tests. The multi-purpose socket is used to measure SMTs as well. This operating manual covers information on safety and precautions to fulfill CE standards. Please read the relevant information carefully and observe all the warnings and notes.

⚠Warning
To avoid electric shock or personal injury, read the "Safety Information" carefully before using the Meter.

Unpacking & Inspection

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

Item	Description	Qty
1	Operating Manual	1 piece
2	Test Leads	1 pair
3	K-type Temperature Probe (Nichrome-Nickel Aluminum Thermocouple)	1 piece
4	Multi-Purpose Socket	1 piece

In the event that you find any parts missing or damaged, please contact your dealer immediately.

Safety Information

This meter complies with the IEC/EN61010-1 standard, pollution degree 2, overvoltage category (CAT III 250V) with double insulation. Only use the meter as specified in this operating manual, otherwise the protection provided by the meter may be impaired.

1. Before using the meter inspect the case. Do not use the meter if it is damaged or if the case (or part of the case) is removed. Look for cracks or missing plastic. Pay attention to the insulation around the connections.
2. Inspect the test leads for damaged insulation or exposed metal. Before using the meter replace any damaged test leads with test leads of the same model number or of the same electrical specifications
3. 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.
4. Turn measurement on only if the correct input terminals are used.
5. Do not apply more than the rated voltage, as marked on the meter in order to avoid possible electric shock or personal injury and to avoid possible damage to the meter
6. Do not change the measuring range during the testing as it causes damage to the meter.

7. When each measurement has been completed, disconnect the test leads from the DUT and then turn the power off from the meter. Remove the test leads from the input terminals of the meter. This is vital for high current measurement.
8. When the meter is working at an effective voltage over 60V in DC or 30Vrms in AC, special care should be taken.
9. Do not use or store the meter in an environment with high temperature and humidity. The performance of the meter may deteriorate if dampened.
10. The internal circuit of the meter should not be tampered with. To avoid damage to the meter when cleaning, use soft cloth and mild detergent to clean the surface of the meter when servicing. No abrasives or solvent should be used to prevent the surface of the meter from corrosion and damage.

International Electrical Symbols

	Battery has insufficient charge
	Ground
	Warning: Refer to the Operating Manual
	AC (Alternating Current)
	DC (Direct Current)
	Double Insulated
	Conforms to Standard of European Union

Overall Specification

1. Maximum voltage between any terminal and ground: Refer to the different input protection voltage ranges shown on the terminals.
2. 10A terminal: Set (CE) 10A H 240V Fast Type Ceramic Fuse ϕ6x25mm.
3. mA terminal: Set (CE) 1 A H 240V Fast Type Ceramic Fuse ϕ6x25mm.
4. Operating temperature: 0˚C~40˚C, 32˚F ~104˚F.
   Relative Humidity: 0˚C ~30˚C below ≤75%, 30˚C ~40˚C below ≤50%.
   Storing temperature:-10˚C ~50˚C (14˚F ~122˚F).
5. Electromagnetism:
   Under 1V/m emission: Best Total Accuracy= Specific Accuracy + Measurement 5%, Over 1V/m emission does not have any specific index.
6. Elevation: 0~2000m.
7. Internal battery: 9V 6F22 or NEDA 1604 or 006P.
8. Low Battery: indicated by "  " on the LCD display.
9. Product size: 72mm×137mm×35mm.
10. Net Weight: About 200g (battery included).
11. Safety Standard:
    IEC/EN 61010-1: CATIII 250V, Pollution Degree 2.
12. Conformance: CE.

The Meter Structure (see diagram 1)

1. LCD Display
2. Power Button
3. Rotary Switch
4. Input Terminals
5. HOLD Button

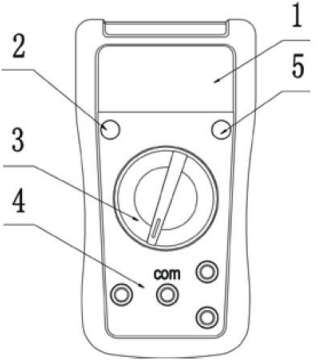


diagram 1

MEASUREMENT OPERATION

First check to see that the 9V battery is charged. Turn the rotary switch to a measurement position. If the battery charge is low, the "  " indicator will be displayed on LCD panel. Ensure the input voltage or current does not exceed 250Vrms and 10A, respectively.

DC or AC Voltage Measurement (see diagram 2)

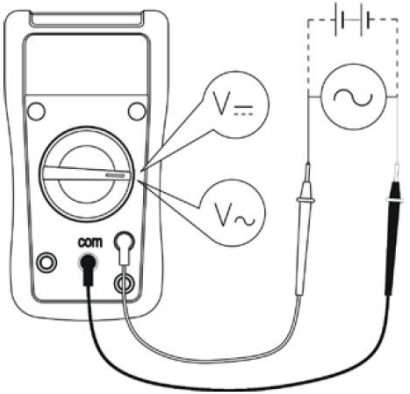


Diagram 2

1. Turn the rotary switch to the V~ or V⎓ position for voltage measurement.
2. Insert the red test lead into the "V" terminal and the black test lead into the "COM" terminal, Connect the test leads to the DUT being measured. The measured value shows the true root mean square voltage (for stable inputs).
3. For each range, the meter has an input impedance of 10MΩ. Input impedance for V~ is about 4.5MΩ. 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).

⚠**Warning:**

- **To avoid damage to the meter, please do not attempt to input more than 250V.**
- **To avoid electrical shock, please pay attention during high voltage measurement.**

DC Current Measurement (see diagram 3)

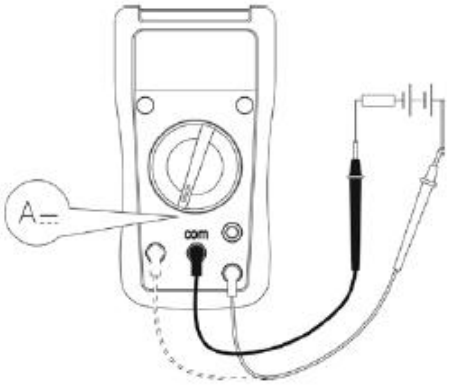


Diagram 3

1. Turn the rotary switch to the "A ⎓" position for current measurement.
2. Insert the red test lead into the "mA" or "10A" terminal, and the black test lead into the "COM" terminal. Connect the test leads to the DUT being measured. The measured value shows on the display.

⚠**Warning:**

- **Pre-requisites: Remove the power from the circuit before connecting the test leads to the DUT.**
- **Select the correct terminal input and turn the rotary switch to select the measurement function. If the correct range is not known, select the highest range and work your way down to a lower range if needed.**
- **Fuses are located on the mA and 10A current input terminals. Never attempt connecting the test leads to any circuits that are connected to mains power.**
- **For safety purposes, ensure each measurement over 5A is performed for less than 10 seconds with a 15 minute interval between measurements.**

Resistance Measurement (see diagram 4)

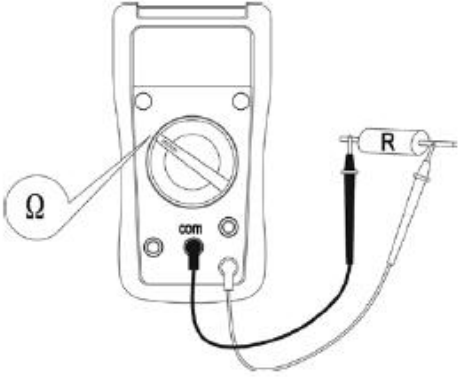


Diagram 4

1. Turn the rotary switch to the "Ω" position for resistance measurement.
2. Insert the red test lead into the "Ω" terminal and the black test lead into the "COM" terminal. Connect the test leads to the DUT being measured. The measured value shows on the display.

⚠ **Warning:**

- **If the LCD displays "1", it indicates the circuit is open or that the resistance exceeds the maximum range of the meter.**
- **To maintain the resistance measurement accuracy, remove circuit power and discharge all high voltage capacitors when measuring resistance.**

  The test leads cause a resistance drop of 0.1Ω ~0.2Ω. In order to obtain precise readings for low-resistance measurements, the resistance of the test leads must be deducted from the measured resistance. Short the test leads and note the measurement result. Deduct this value from the resistance of the DUT. Measured Result of DUT – Resistance of test leads = Actual measurement.
- **If a resistance reading with shorted test leads is not less than or equal to 0.5Ω, check for possible problems such as loose test leads or an incorrectly selected function.**
- **For resistance measurements greater than 1MΩ, it may take several seconds to obtain a stable reading.**
- **Do not input greater than DC 60V and AC 30V to prevent damage and injury.**

Diode Measurement (see diagram 5)

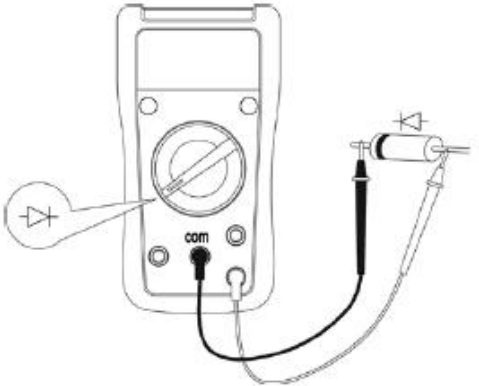


Diagram 5

1. Turn the rotary switch to the "⊣•)) " position for diode measurement.
2. Insert the red test lead into the "⊣" terminal and the black test lead into the "COM" terminal. The red test lead is "+", the black test lead is "-".
3. In a circuit, a good diode should still produce a forward voltage drop reading of 500~800mV. However, a reverse voltage drop reading can vary depending on the resistance of other pathways between the probe tips.

⚠Warning:

- **The LCD displays "1" to indicate that the circuit is open or that the polarity of the diode is incorrect.**
- **To ensure the accuracy of the diode measurement, disconnect power from the circuit and discharge all high voltage capacitors during the measurement.**
- **The open circuit voltage for diodes is 2.3V.**
- **Do not input greater than DC 60V and AC 30V to prevent damage and injury.**

Continuity Measurement (see diagram 6)

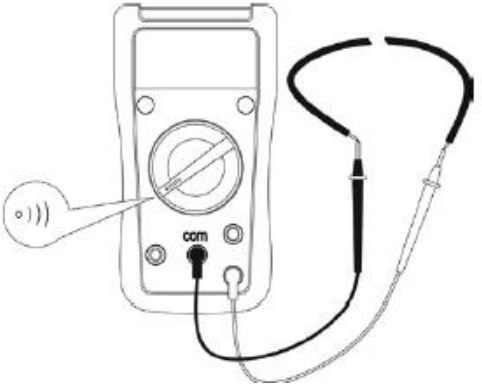


Diagram 6

1. Turn the rotary switch to the "→|– •)) " position.
2. Insert the red test lead into the "ΩmA" terminal and the black test lead into the "COM" terminal. If the resistance between both terminals is >70Ω, it indicates an open-circuit and no buzzer will sound, but if the resistance between both terminals is ≤10Ω, it indicates a good connection and the buzzer will sound. The resistance measurement is displayed on the LCD (Unit: Ω).

⚠**Warning:**

- **To maintain measurement accuracy, disconnect circuit power and discharge all the high voltage capacitors during continuity measurement.**
- **For continuity testing, the open circuit for voltage is 2.3V.**
- **Do not input higher than DC 60V and AC 30V voltage to prevent any damage and injury.**

Transistor hFE measurement (see diagram 7)

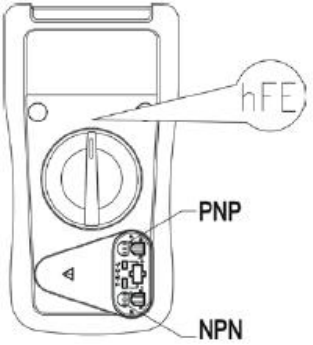


Diagram 7

1. Turn the rotary switch to the "hFE" position.
2. Put the multi-purpose socket into the terminal.
3. Check whether the transistor is either PNP or NPN or SMT, then connect the transistor to be measured to the corresponding jacks.
4. The LCD display shows the hFE reference value. The testing requirement: basic current 10μA,Vce of 2.3V.

⚠**Warning:**

- **To avoid damage to the Meter or to the DUT, do not input any voltage over 60V DC or 30V AC.**
- **Take off the multi-purpose socket after the measurement.**

Temperature Measurement (see diagram 8)

Diagram 8

1. Turn the rotary switch to the "˚C" position.
2. Put the multi-purpose socket into the correct terminal.
3. The K-type thermocouple can only be used for measurements below 230˚C, if you want to measure over 230˚C, you need to buy another type of thermocouple.
4. When the LCD displays "1", it indicates that the K-type thermocouple is not connected. When the ˚C terminal and the COM terminal are shorted, the meter will show the room temperature.

⚠**Warning:**

- **Keep the thermocouple clean to prevent the contact point from having any serious influence on measurements.**
- **Remove the contact point after temperature measurement and store in good condition.**

ACCURACY SPECIFICATIONS

Accuracy: ±(a% reading + b digits), guaranteed for 1 year
Operating temperature: 23˚C ± 5˚C
Relative Humidity: <75%

DC Voltage

Range	Resolution	Accuracy
200mV	0.1mV	±(0.5% Reading + 2 Digits)
2000mV	1mV	
20V	0.01V	
200V	0.1V	
250V	1V	±(0.8% Reading + 2 Digits)

Input impedance: all range 10MΩ.
Maximum input voltage: 250V DC.

AC Voltage

Range	Resolution	Accuracy
200V	0.1V	±(1.2 Reading% +3 Digits)
250V	1V	

Input impedance: about 4.5MΩ;
Frequency: 45Hz~400Hz.
Display: effective value of a sine wave (average value) each measurement is applicable from 5% of range as reference.
Maximum input voltage: 250V AC.

DC Current

Range	Resolution	Accuracy
2000μA	1μA	±(1% Reading +2 Digits)
20mA	0.01mA	±(1% Reading + 2 Digits)
200mA	0.1mA	±(1.2% Reading +2 Digits)
10A	0.01A	±(2% Reading +5 Digits)

Overload Protection:
mA range: F2 fuse ϕ6×25mm, F 1A H 240V (CE)
10A range: F1 fuse ϕ6×25mm, F 10A H 240V (CE)

⚠Warning:
When ≤ 5A Continuous measurement is allowed.
When > 5A Measurements must not take longer than 10 seconds with a wait of 15 minutes between measurements.

Resistance

Range	Resolution	Accuracy
200Ω	0.1Ω	±(0.8% Reading + 5 Digits)
2000Ω	1Ω	
20kΩ	0.01kΩ	
200kΩ	0.1kΩ	
2000kΩ	1kΩ	
20MΩ	0.01MΩ	±(1% Reading + 5 Digits)

Overload Protection: 250V AC or DC

Temperature Measurement

Range	Resolution	Accuracy
-40˚C~ -20˚C	1˚C	-(8% Reading + 5 digits)
-20˚C~0˚C		± 4 digits
> 0˚C~100˚C		±(1.0% Reading + 3 digits)
>100˚C~1000˚C		±(2.5% Reading + 2 digits)

Overload Protection: 250V DC or AC

The enclosed K-type thermocouple can only be used for temperature measurements less than 230˚C.

Diode, Transistor

Function	Range	Resolution	Remark
Diode		1mV	Display positive voltage decline
Transistor	hFE	1β	

Continuity Test

Function	Range	Resolution	Remark
Continuity Test		1Ω	<10Ω Buzzer beeps continuously

Overload Protection: 250V DC or AC.

MAINTENANCE

⚠Warning
Make sure the test leads are removed and the power is turned off the meter before opening the cover.

General Service and Maintenance

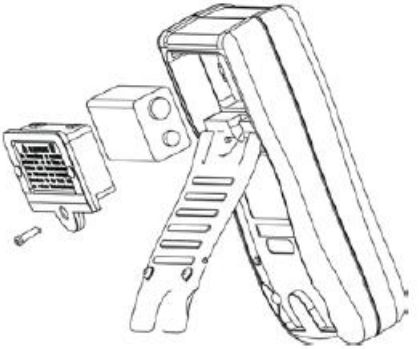
- Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.
- If there are any abnormalities in the meter, stop using the meter and return to an authorized service center.
- When the meter needs to be calibrated, return the unit to an authorized service center.

Replacing the Battery and Fuse (see diagram 12)

⚠ Warning

On the LCD display, the battery warning indicator, "🔋" indicates the battery is low and needs to be replaced with a new battery. Failure to replace the battery causes the measured result to be unstable.

Battery Specification: 9V 6F22 or NEDA 1604 or 006P



(diagram 12)

Operating Steps:

1. Turn the power off and remove the test leads from the meter.
2. Use a screwdriver to remove the screws from the battery cover. The old battery can now be removed.
3. The fuses can be replaced by using a screwdriver to remove the two screws holding the fuses in place. Only replace fuses with the same type and specifications.
   Fuse specification:
   F1 Fuse ϕ 6×25mm, F 10A H 240V
   F2 Fuse ϕ 6×25mm, F 1A H 240V