HIOKI

3004
MULTITESTER

INSTRUCTION MANUAL

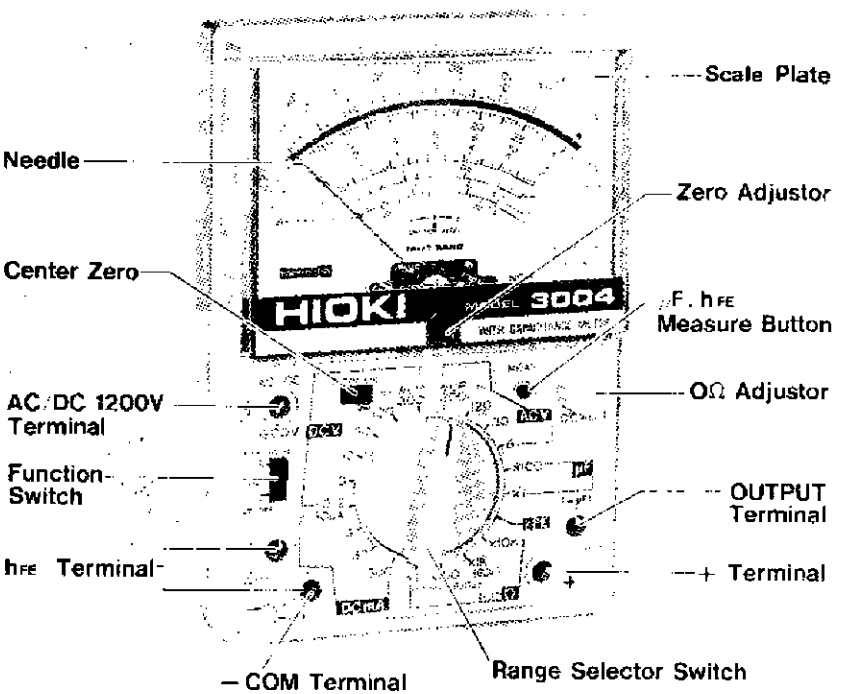
⚠ 安全上の注意
本製品は大容量電路測定用ではありません。ヒューズによる安全保護は250V、しゃ断容量500Aとなっておりますのでこの定格を超える大容量電路での測定は避けて下さい。
当社では大容量電路測定用として〝3008〟が用意されています。

⚠ IN HIGH POWER CIRCUIT AREA (DISTRIBUTION TRANSFORMER AND BUS BAR) BEFORE ATTEMPTING ANY MEASUREMENT, DOUBLE CHECK THAT THE RANGE SWITCH IS AT THE CORRECT POSITION. IF THE RANGE IS INCORRECTLY SET, A DANGEROUS ARC OF EXPLOSION WOULD OCCUR.

WARNING

This instrument is designed to prevent accidental shock to the operator when properly used. However, no engineering design can render safe an instrument which is used carelessly. Therefore, this manual must be read carefully and completely before making any measurement. Failure to follow directions can result in a serious or fatal accident.

NAME OF PARTS



SPECIFICATIONS

DC Voltage: 0.12 · 3 · 12 · 30 · 120 · 300 · 1200V 33.3kΩ/V
(Up to 300V: 10kΩ/V)±2.5%of F.S.
DC Current: 30μ · 3m · 30m · 300mA
120mV drop, ±3% o of F.S.
AC Voltage: 6 · 30 · 120 · 300 · 1200V 10kΩ/V,±2.5%of F.S.
Resistance: 3k · 300k · 3M · 30M (mid-scale: 25Ω)
+3% of Scale Length
Capacity: 0.001−0.2, 0.1~20μF ±4% of Scale Length
h_{FE}: 0−600
Low Freq.
Level: −10~+17, +15~+31dB
Center Zero: DC±15V, ±3% of Scale Length
Batteries: Ω-SUM-3 (AA) 1pc. Ω & C-006P 1pc.
Meter: Self-shielded, diode overload protected TAUT BAND movement
Circuit: Fuse protected
Temperature: −5°C~40°C, operating; −10°C−50°C, storage
Dimensions: 167H×114W×56.5Dmm
Weight: Approx. 450g
Accessories: Test Leads 1set, Alligator Clips 2pcs.
h_{FE} Test Lead 1pc., Spare Fuse (0.5A) 1pc.

Optional Accessories

9004-01	Clamp-On Probe (AC300A)
9012	DC 30kV High Voltage Probe
9085	Carrying Case

GENERAL CAUTIONS CONCERNING USE

1) Turn the zero adjuster and adjust the needle to the O position on the left hand side of the dial.
2) Before measuring, always check to make sure that the correct range has been selected.
3) Before changing the range, make sure to remove the test prods from the circuit being tested.
4) Avoid testing high frequency sections of electronic cooking ranges and other appliances with high output and high frequency because resistance is only a fraction of the usual figure for appliances and shock can easily result.

HOW TO TAKE MEASUREMENTS

Measuring DC Voltage (DCV)

1) Plug the black lead into the [−COM] terminal and the red lead into the ⊖ terminal.
2) Slide the function selector switch to the [+DC · AC · Ω] position.
3) Turn the range selector knob to the most suitable DCV range and if not sure how great the voltage may be, select the highest range to begin with.
4) Connect the test leads in parallel to the voltage being tested, having the black lead connected to the ⊖ side and the red lead to the ⊕ side and take a reading.
5) If the meter needle deflects in reverse, either reverse the test prod connections or slide the selector switch to the [−DC] position.
6) To measure more than 300V DC, plug the red test lead into the [AC/DC 1200V] terminal and turn the range selector knob to the DCV range [300 & UP] position.

Measuring DC Current (DCmA)

1) After carrying out the first two steps set out in the procedure for measuring DC voltage, turn the range selector knob to a suitable DC mA range for the current being tested, connect the test leads in series: red test prod to the

⊕ side of the circuit being tested and the black prod to the ⊖ side and take a reading.

2) As in the case of DC voltage measurement, if the meter needle deflects in the reverse direction, turn the selector switch to the [—DC] position.

* When connecting, first switch off the power.

Measuring AC Voltage (ACV)

1) Prepare in the same way as for the measuring of DC voltage. Turn the range selector knob to a suitable ACV range for the voltage to be measured, connect in parallel to the circuit and take a reading.

2) To measure 300V AC or more, plug the red test lead into the [AC/DC 1200V] terminal, turn the range selector knob to the ACV range [300 UP] position and take a reading.

Measuring Resistance (Ω)

1) After carrying out the first two steps set out in the proced dure for measuring DC voltage, turn the range selector knob to the Ω range.

2) Short the tips of the test prods and adjust the OΩ ADJ knob to bring the meter needle to indicate OΩ. If the needle fails to go to the OΩ position, this is an indication that the battery are exhausted and needs to be replaced.

3) After completing the OΩ adjustment, connect the test prods

to the resistance to be measured.

* When measuring resistance in circuits, do so only after removing the resistor or switching off the power.

Measuring Capacity (μF)

1) Plug the black test lead into the [COM] terminal (—μF) and the red test lead into the [OUTPUT] terminal (+μF)

2) Slide the function selector switch to the [μF, h_{FE}] position.

3) Turn the range selector knob to the μF range x1 or x100.

4) Before taking a reading, press the [MEAS.] switch and check to see that the meter needle deflects to the OμF band on the extreme right hand side of the Ω scale. If it fails to do so, the battery is exhausted and needs to be replaced.

5) If the capacitor being tested is a polarized type, connect the red test lead to the ⊕ side and the black lead to the ⊖ side, push the [MEAS.] switch and double the black number indicated on the Ω scale to obtain the actual reading. (The effective reading range is 0.001 – 20μF)

* Since the testing voltage of the capacity is approximately 4.5V, do not test capacitors with a lower dielectric strength than that.

* If the capacitor is in a charged condition, damage to the tester may result and for this reason do not fail to discharge the capacitor before testing.

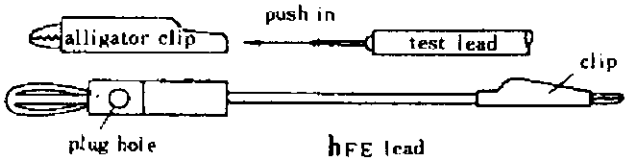
Measuring the current amplification factor of transistors (h_{FE})

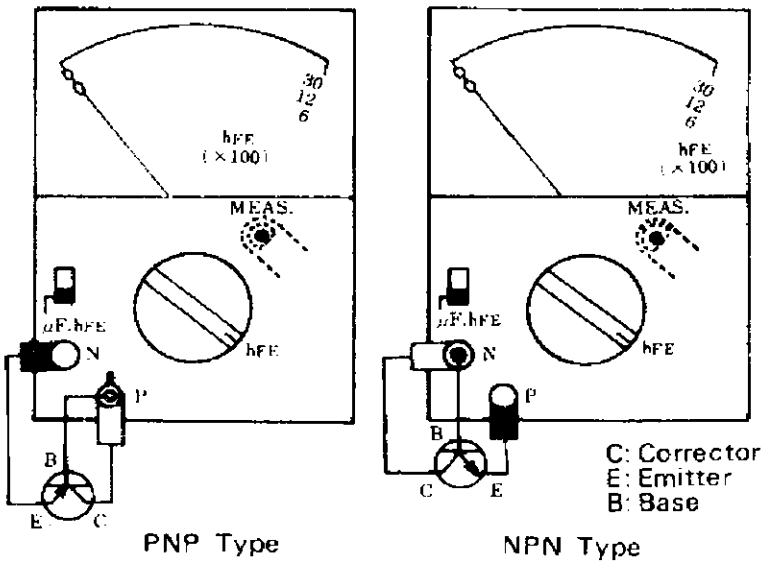
1) Turn the selector to [$\mu F \cdot h_{FE}$] and the range to h_{FE}.
2) Measuring the h_{FE} of 2SA or 2SB type PNP transistors Plug the h_{FE} lead into the −COM terminal (marked P) and plug the red lead into the side. Then plug the black test lead into the terminal marked N. Hold the red test prod to the collector side of the transistor being tested, put the small alligator clip of the h_{FE} lead on the base side and the back test prod on the emitter side and, while pushing the [MEAS.] switch, multiply the figure indicated between 0 and 6 on the uniformly graduated scale by 100 to obtain the true reading.
3) Measuring the h_{FE} of 2SC or 2SD type NPN transistors Plug the h_{FE} lead into the terminal marked N, plug the red test lead into the side and plug the black lead into the terminal marked P (the −COM terminal). Connect to the transistor in the same manner as in 2), above, and take a reading. Alternatively the clip may be atfached to one of the leads of the transistor.

   It will sometimes be found effective to fit an alligator clip to the end of each of the test prods.

* When the h_{FE} measuring terminals are short-circuited and the [MEAS.] switch pushed, because a considerable of current will flow, the battery will soon be exhausted and for this reason this method is to be avoided. Use the

BATTERY CHECK method to check the condition of the h_{FE} measuring battery (006P type).





Using the OUTPUT terminal in measuring.

This terminal is used in measuring AC voltage only in a circuit where there are both AC and DC voltages and a DC blocking condenser (0.μF) is connected.

Measuring Decibels (dB)

A dB slace is provided (0dB = 1mW, 600Ω as a standard) and is handy to use in measuring the output of amplifiers, etc. For over the 120V AC range, read off the 30V AC scale, for the 120V AC range add 12dB and for the 300V AC range add 20dB.

Using the LI and LV Scales

For use in measuring resistance, an LV (load voltage) scale is provided to give a reading of the voltage present when measuring resistance and an LI (load current) scale to show the current and these prove very useful to use in testing the characteristics of semiconductors. The measuring procedure is the same as that for measuring resistance, LV being shown on the reverse scale at 0–1.5V, LI, according to the range, at 60 mA on the x1 range, 600μA on the x100 range and 60μA on the x1K range. For example, it is possible to check the leakage current (Iceo) between the collector and emitter of a transistor or the characteristics of a diode. Also, since the LI and LV scales show readings when the internal battery voltage is 1.5V, the values should be taken only as a guide.

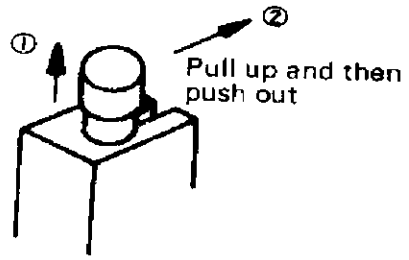
How to Use the Center Zero

When the CENTER ZERO selector switch is switched ON while operating on the 30V DC range, a [±15V] voltmeter function is made possible. Preparation for measuerment is the same as for the DC voltmeter and the function selector switch is left at the [⎓ DC.AC.Ω] setting.

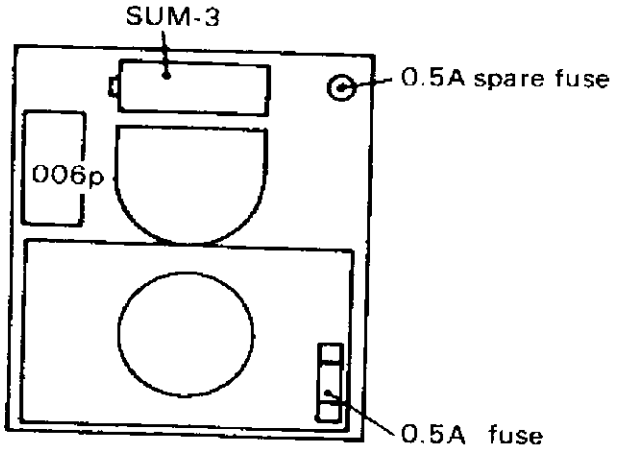
This center zero is very handy to use in checking semiconductor circuits, etc., where both ⊕ and ⊖ power is used. If the meter needle fails to point to the center zero mark (▲), use after adjusting by means of the zero adjuster and after using adjust to the left hand side O position by means of the zero position adjuster.

CHANGING THE BATTERIES AND FUSE

1) Use a coin or other suitable implement to unscrew the decorative screw holding the back of the case and remove this case back.
2) Take the sketches as a guide and change the parts.



* How to remove the spare fuse

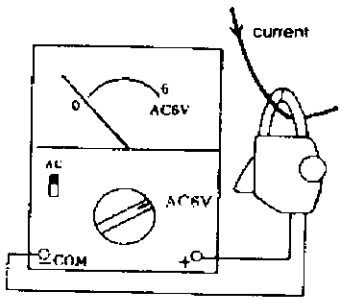


OPTIONAL ACCESSORIES

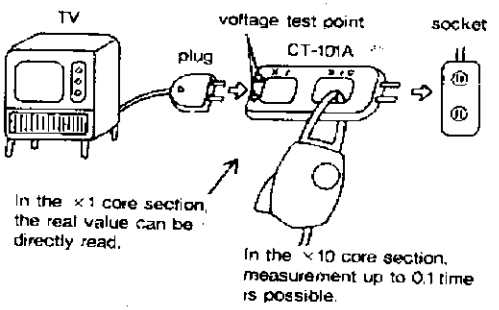
(1) 9004 Clamp-on Probe

Readings up to 300A can be obtained and, unlike ordinary ammeters, it is not necessary to disconnect the line being tested but simply clamp this probe over it. When used together with the CT-101A Line Splitter amperage readings can be simply obtain in the case of most ordinary types of electrical appliances.

- Test Range: 0~6A, 12A, 30A, 120A, and 300A AC
- Tolerance: Not over ±6% of scale maximum (When used in combination with the 3004 Multitester)
- How to Use: Use the 6V AC range on the Multitester when employing this probe.



The 9004 Clamp-on Probe which is simply clamped over the line for tests

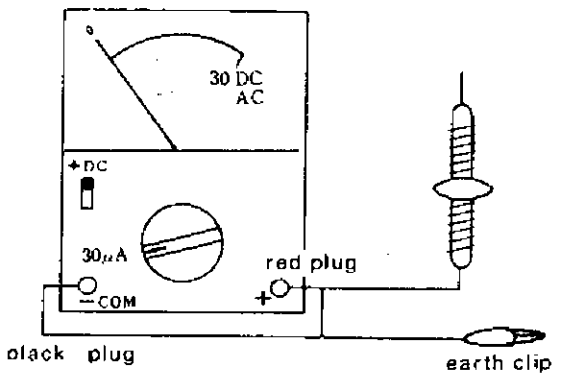


Used with the CT-101A it is handy in amperage tests on electrical appliances

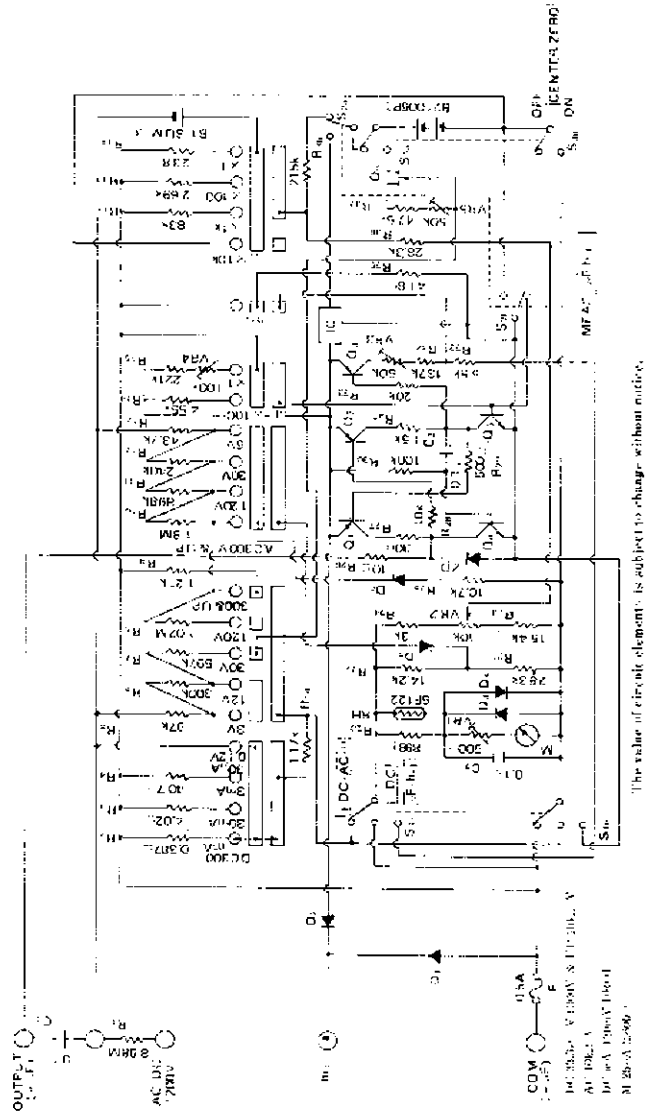
(2) 9012 High Voltage Probe

This is a 30kV DC capacity high voltage probe designed for great dielectric strength and outstanding insulating properties to make safety certain and to facilitate the testing of high voltage DC equipment such as TV Braun tubes, etc.

- Test Voltage: 0 – 30kV DC (Internal resistance: 1000MΩ)
- Tolerance: Not over ±5% of maximum reading (when used with the 3004 Multitester)
- How used: With tester on 30μA DC range.



CIRCUIT DIAGRAM



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