

SANWA

OPERATOR'S MANUAL



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**FOR
TH-500
THERMOMETER**

Printed in Japan

PREFACE

Manufactured in a completely quality-controlled factory, the **TH-500** Electric Thermometer is a highly dependable and durable instrument. A testing meter, however, is an instrument very delicately constructed, and this booklet should be read carefully before the meter is put to operation in order to have all the advantages it offers thoroughly displayed.

When the instrument is used in a factory to check such power supply system as substation equipment, any slight misuse might cause unforeseen accident, and special care must be used in the handling and maintenance of the instrument.

TH-500 THERMOMETER



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1 INTRODUCTION

The **TH-500** is a handy, pocket-size electric thermometer endowed with the following benefits:

Quick Response. Using a temperature sensitive thermistor as thermal element, temperature ranging from -50°F to 570°F is readily read on the double scale provided.

AC Voltmeter. Two AC voltage ranges reading 150V and 300V at full scale measure the power voltage of a unit of which the temperature capacity may be checked.

Ohmmeter. The ohm scale provided not only measures resistance up to $100\text{k}\Omega$, but also is available to check the line continuity of electric heating appliances.

Temperature Compensation. The temperature compensation circuit using a semiconductor gives the meter movement good temperature characteristic.

Double Safety Device. The pivots of the moving element are supported by spring-backed jewel

bearings to protect them from shock and vibration, and the OFF setting of the range switch and the TEMP•OHMS position of the selector switch electrically damp the meter movement.

2 SPECIFICATIONS

2-1 MEASUREMENT RANGES.

Temperature (°F): LO - -50°~230°
HI - -250°~570°
AC voltage (V): 150V 300V (4k Ω/V)
Resistance (Ω): 0Ω~100k (Midscale - abt. 2.5kΩ)

2-2 BATTERIES. 1.5V (UM-3) ×2 and 9V (006P) ×1

2-3 ALLOWANCE. Within ±2% of arc for temperature
Within ±4% f.s.d. for AC voltage
Within ±3% of arc for resistance

2-4 SIZE & WEIGHT.

157×118×45mm & 830gr w/accessories

3 OPERATING INSTRUCTIONS

3-1 ZERO ADJUSTMENT.

This is to adjust the pointer to zero of the ACV scale by turning the adjusting screw located just below the scale dial. It need not be repeated very often, but before every measurement, at least check to see the pointer position to avoid erroneous reading. Use a small screwdriver to turn the adjusting screw.

3-2 SWITCH SETTING AND CORD CONNECTIONS.

There are two switch operations; the range switch in the center and the selector switch on the upper right. Four terminal jacks are the COM jack which is used by one of the test leads in common for AC voltage and resistance measurements, the OHMS jack and the range jacks on the right for AC voltage measurement. The temperature probe is connected to the meter using the connector on the right flank. Thus a measurement need is determined by the combination of the range switch and the selector switch settings and use of a proper terminal jack. See the following table:

Measurement	Connections	Range switch	Selector switch	Scale to read
215°~570°	Temp. probe to connector	HI	TEMP OHMS	Black scale(HI)
-50°~230°	- do -	LO	- do -	Black scale(LO)
300V AC	COM & AC 300V	—	ACV	Red scale (0-300)
150V AC	COM & AC 150V	—	ACV	Red scale (0-150)
0~100kΩ	COM & OHMS	OHMS CHECK	TEMP OHMS	Green scale

4 OPERATION

The meter should be operated in the order of the sequence given.

4-1 MEASURING TEMPERATURE.

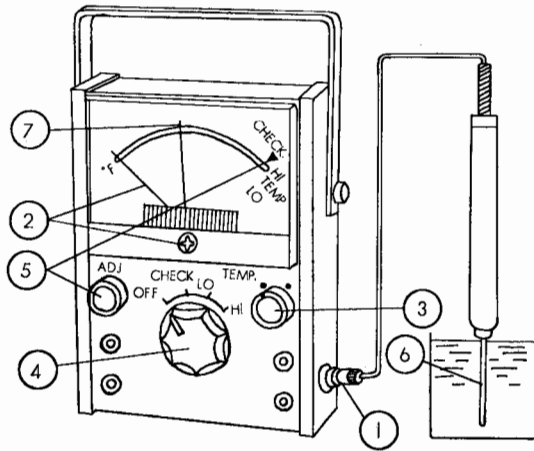


Fig. 1 - Measuring temperature (liquid)

4-1-1 Connect the temperature probe to the connector.

4-1-2 Adjust the pointer to zero of the ACV scale, when the selector switch should be positioned halfway between the TEMP•OHMS and ACV marks.

4-1-3 As the pointer is adjusted, place the selector switch at the TEMP•OHMS position.

4-1-4 Rotate the range switch from OFF to the CHECK position.

4-1-5 Turn the ADJ knob and place the pointer at the CHECK mark (▼) on the right.

4-1-6 Apply the temperature probe point to the place where the temperature is to be taken.

4-1-7 For measurement of -50° to 230° , rotate the range switch to the LO position, and for 215° to 570° , to the HI position. Read the temperature along the pair of the top black scales.

NOTE. (1) When taking a high temperature above 500° , be careful not to have the plastic bar touch the heated unit and get heated.

(2) The temperature probe is character-

istic to this instrument. It is interchangeable only between the probes of the same characteristic. Always use the probe attached.

4-2 MEASURING AC VOLTAGE.

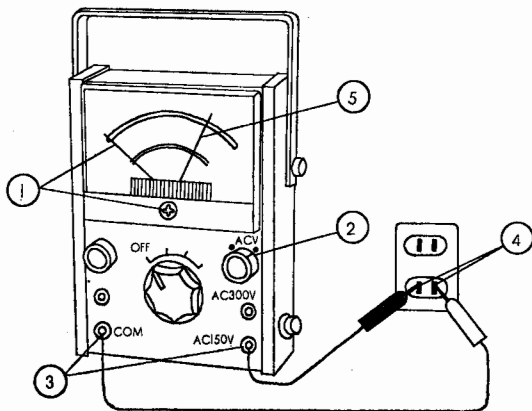


Fig. 2 - Measuring AC voltage (power outlet)

- 4-2-1 Adjust the pointer to zero of the ACV scale.
- 4-2-2 Rotate the selector switch to the ACV position.

- 4-2-3 Connect the test leads to the meter using either the 150V or 300V and the COM jacks.
- 4-2-4 Apply the probe points of the test leads across the voltage being measured.
- 4-2-5 Use the pair of the red scales marked ACV. Readings are correct no matter to which side of the voltage the test leads are connected.

NOTE. Neither the range switch nor the ADJ knob has anything to do with AC voltage measurement.

4-3 MEASURING RESISTANCE.

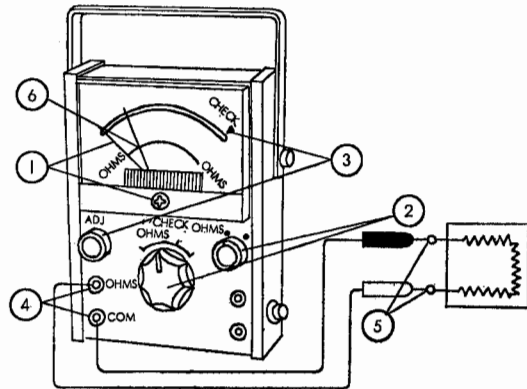


Fig. 3 - Testing continuity (heater)

- 4-3-1 Adjust the pointer to zero of the ACV scale.
- 4-3-2 Rotate the selector switch to the TEMP•OHMS position and the range switch to the CHECK•OHMS position.
- 4-3-3 Place the pointer at the red CHECK mark (▼) on the right by turning the ADJ knob.
- 4-3-4 Connect the test leads to the meter using the OHMS and COM jacks.

- 5-3-5 Apply the probe points of the test leads across the resistance being measured, or across the circuit where continuity is tested.

- 4-3-6 Take the reading on the bottom green scale marked OHMS.

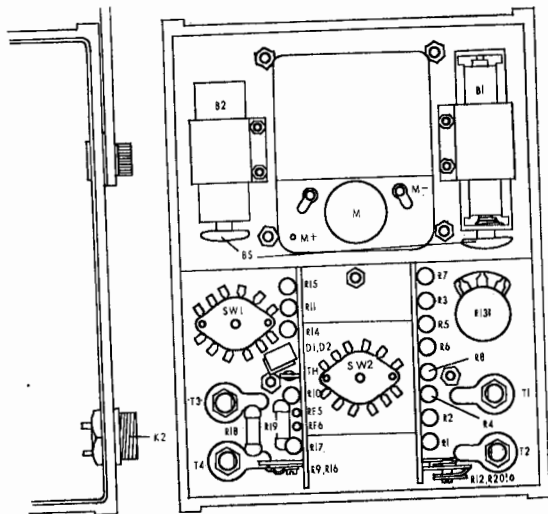
5 PRECAUTIONS

- 5-1 At each measurement, confirm if the combination of the switch settings and the connections of the test leads are correct. If AC voltage is measured with the selector switch erroneously placed at the TEMP•OHMS position, the internal components will be permanently damaged rendering the instrument out of use.
- 5-2 Avoid placing the meter in the direct sun or where there is high temperature or moisture not to damage the meter movement or deteriorate the rectifier.
- 5-3 Do not use the meter in the strong magnetic field or placing it on an iron plate. It will cause erroneous reading upsetting the sensitivity of the meter movement.
- 5-4 If the pointer can not be adjusted to the CHECK mark (▼), the internal batteries have worn out needing replacement. Exhausted batteries should be immediately replaced, or electrolyte might leak to corrode the internal components. When the instrument is not

used for months, the batteries had better be taken out. While it is kept unused, set the range switch to the OFF and the selector switch to the TEMP•OHMS positions so that the meter movement may be electrically damped.

6 SUPPLEMENTARY DATA

6-1 ARRANGEMENT OF PARTS.



6-2 LIST OF MAIN PARTS

R. S.	Description
R1	Resistor, 81.2~83.0k Ω (film, $\frac{1}{2}$ W)
R2	Resistor, 251~259 Ω (film, $\frac{1}{2}$ W)
R3•R7	Resistors, 16k Ω (film, $\frac{1}{2}$ W)
R4•R8	Resistors, 2k Ω (film, $\frac{1}{2}$ W)
R5	Resistor, 93.5k Ω (film, $\frac{1}{2}$ W)
R6	Resistor, 300 Ω (film, $\frac{1}{2}$ W)
R9	Resistor, 1.5k Ω (semifixed)
R10	Resistor, 500 Ω (film, $\frac{1}{2}$ W)
R11	Resistor, 784 Ω (film, $\frac{1}{2}$ W)
R12	Resistor, 1k Ω (semifixed)
R13	Potentiometer, 1k Ω
R14	Resistor, 640 Ω (film, $\frac{1}{2}$ W)
R15	Resistor, 1.20~1.48k Ω (film, $\frac{1}{2}$ W)
R16•R20	Resistors, 2k Ω (semifixed)
R17	Resistor, 5.5k Ω (film, $\frac{1}{2}$ W)
R18•R19	Resistors, 580k Ω (film, $\frac{1}{2}$ W)

R. S.	Description
RF5•RF6	Diodes
TH2	Thermistor for temperature compensation
D1•D2	Diodes for constant voltage
K2	Connector for temperature probe
B1	Battery, 1.5V (UM-3), 2 required
B2	Battery, 9V (006P)
BS	Battery snap, 2 required
M	Meter movement, $80\mu\text{A} \odot 900\Omega$ (moving coil type)
M+	Meter movement + jack
M-	Meter movement - jack
SW1	Selector switch
SW2	Range Switch
T1~T4	Terminal jacks, 4 required

R.F. Reference symbol