

YX360TRF MULTITESTER

INSTRUCTION MANUAL

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05-1306 2040 2040

INTRODUCTION

Thank you for purchasing a SANWA tester Model YX360TRF. You are kindly requested to thoroughly read this manual before use for safety. Especially, "SAFETY INFORMATION" and "MEASURING PROCEDURE" are important. Keep this manual together with the tester so as no to lose it.

NAMES OF COMPONENTS

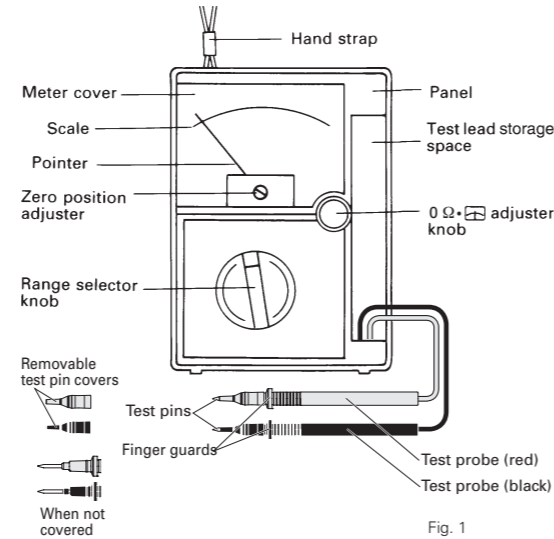


Fig. 1

- 1 -

SAFETY INFORMATION

The following are precautions to prevent accidents such as electrical shocks.
Be sure to read them before using the tester.

■ Symbols

The following cautionary signs appear on the multimeter and in this manual.

⚠ Disobedience to instructions with this sign may lead to trouble with the tester and accidents such as electrical shock.

⚡ This sign cautions that high voltage is applied to parts marked with it.

■ Precautions for Safety Measurement

⚠ WARNING

To ensure that the meter is used safely, follow all safety and operating instructions.

1. Never use the meter on the electric circuits that exceeds 3 kVA.
2. Pay special attention when measuring the voltage of AC 33 Vrms (46.7 V peak) or DC 70 V or more to avoid injury.
3. Never apply input signals exceeding the maximum rating input value.
4. Never use the meter for measuring the line connected with equipment (i.e. motors) that generates induced or surge voltage since it may exceed the maximum allowable voltage.
5. Never use the meter if the meter or test leads are damaged or broken.
6. Never use an uncased meter.

- 2 -

7. Be sure to use a fuse of the specified rating or type. Never use a substitute of the fuse or make a short circuit of the fuse.
8. Always keep your fingers behind the finger guards on the probe when making measurements.
9. Be sure to disconnect the test pins from the circuit when changing the function or range.
10. Before starting measurement, make sure that the function and range are properly set in accordance with the measurement.
11. Never use the meter with wet hands or in a damp environment.
12. Never use test leads other than the specified type.
13. Never open the case except when replacing batteries or fuses. Do not attempt any alteration of original specifications.
14. To ensure safety and maintain accuracy, calibrate and check the meter at least once a year.
15. Indoor use only.

APPLICATION

■ Application

This instrument is portable multimeter designated for measurement of weak current circuits.

The specifications described in this manual are subject to change without notice.

- 3 -

BODY COVER, TEST LEADS, HAND STRAP

■ Use of Cover (example for the body cover)

When this tester is out of use:
Attach the cover to the panel face for safekeeping.
When measuring:
Attach it either to the rear case side or use it as a stand as shown below.

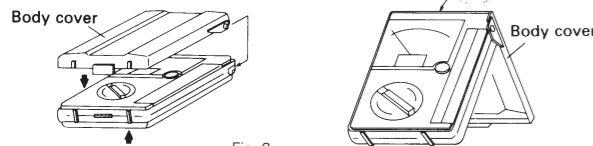
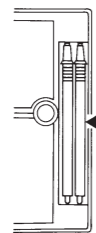


Fig. 2

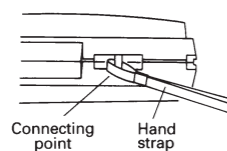
■ Storage of Test Leads

When placing the test leads in the storage space, roll it 3 times, then put in the test pin side first as shown below.



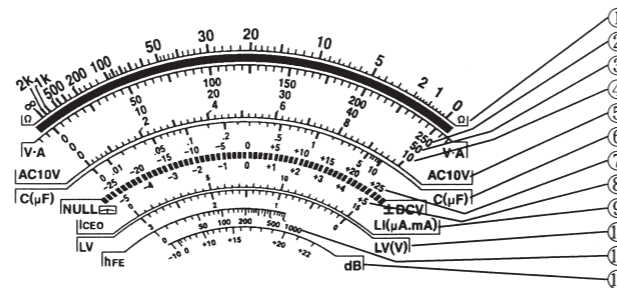
■ Attachment of Hand Strap

1. Loosen the screws fixing the rear case and remove it.
2. Hand strap is attached to connecting point.
3. Put back the rear case where it was and fix it with the screws.



- 4 -

SCALE READING



Range	Multiplied	Range	Multiplied
Ω X 100 k	X 100 k	DCV 10	X 1
Ω X 1 k	X 1 k	④ DCV 1000	X 100
① Ω X 100	X 100	ACV 750	X 100
Ω X 10	X 10	⑤ ACV 10	X 1
Ω X 1	X 1	⑥ C (μF)	X 1
DCV 250	X 1	⑦ DCV ± 25	X 1
DCV 2.5	X 0.01	⑧ DCV ± 5	X 1
DCV 0.25	X 0.001	150 mA at X 1	X 10
ACV 250	X 1	15 mA at X 10	X 1
DCA 0.25	X 0.001	⑨ 1.5 mA at X 100	X 0.1
DCA 25 m	X 0.1	150 μA at X 1 k	X 10
DCA 2.5 m	X 0.01	1.5 μA at X 100 k	X 0.1
DCV 50	X 1	⑩ LV	X 1
ACV 50	X 1	⑪ hFE	X 1
DCA 50 μ	X 1	ACV 10	X 1
DCV 0.1	X 0.01	ACV 50	14 dB added
		⑫ ACV 250	28 dB added
		ACV 750	40 dB added

- 5 -

SPECIFICATIONS

■ General Specifications

(Temperature : 23±2 °C humidity 75 % RH max. No condensation)

Items	Specification
Drop shock proof	A taut-band structure is adopted in the meter part. The meter part is designed to withstand shock.
Circuit protection	The circuit is protected by fuse even when voltage of up to AC 230 V is impressed on each range for 5 seconds.
Internal battery	R6 (IEC) or UM-3 1.5 V X 2
Internal fuse	F500 mA/250 V Ø5.2 X 20 mm Fast acting fuse
Operating temperature and humidity range	5 ~ 31 °C, 80 %RH max. 31 ~ 40 °C, 80 ~ 50 %RH (decreasing linearly)
Storage temperature/ Humidity	-10 ~ 50 °C 70 %RH max. No condensation
Withstand voltage	6 kV AC (1 min.) between input terminal and case
Dimensions and mass	159.5 X 129 X 41.5 mm/ approx. 320 g
Environmental condition	Operating a liitude up to 2000 m pollution degree 2
Accessories	Instruction manual 1, Hand strap 1,

• HV probe, HV-10T • hFE probe, HFE-6T • Test lead for repair, TL-6ITb

■ Measurement Range and Accuracy

Function	Full scale value	Accuracy	Remarks
DCV $\overline{\text{---}}$	0.1	±5 % against full scale	Input impedance 20 kΩ/V
	0.25/2.5/10/50	±3 % against full scale	
	250/1000	±3 % against full scale	Input impedance 9 kΩ/V
DCV (NULL)	±5/±25	±5 % against full scale	Input impedance 40 kΩ/V
ACV ~	10/50/250/750	±4 % against full scale	Input impedance 9 kΩ/V 30 Hz ~ 100 kHz within ±3 % f.s. (AC 10 V range)
DCA $\overline{\text{---}}$	50 μ	±3 % against full scale	*1 Voltage drop 0.1 V
	2.5 m/25 m/0.25	±3 % against full scale	*1 Voltage drop 0.25 V
Ω	2 k/20 k/200 k/2 M (X1/X10/X100/X1 K)	±3 % of arc	Center value 20 Ω Max. value 2 kΩ Release voltage 3 V
	200 M (X100 K)	±5 % of arc	
C	10 μF	Approximate Value	*2
dB	-10 dB ~ +22 dB (for 10 VAC) ~ +62 dB	Approximate Value	Input impedance 9 kΩ/V
LI	0 ~ 150 mA at X1 range 0 ~ 15 mA at X10 range 0 ~ 1.5 mA at X100 range 0 ~ 150 μA at X1 K range 0 ~ 1.5 μA at X100 K range	Approximate Value	Current across test pins
Use the optional probe			
HV (DC high volt)	DC 25 kV		HV-10T probe
hFE	1000 at X10 range		HFE-6T probe

*1 Not including the resistance of fuse.

*2 The maximum value when the pointer was moved by charged current in the capacitor.

- 6 -

- 7 -

WARNING
Confirm the range of use before measurement.

Preparation for Measurement

- Adjustment of meter zero position:
Turn the zero position adjuster so that the pointer may align right to the zero position.
- Range selection:
Select a proper range for the item to be measured and set the range selector knob accordingly.

NOTE

When determining a measuring range, select a one higher voltage than the value to be measured as well as where the pointer of a meter moves to a considerable extent. However, select the maximum range and measure in case the extent of value to be measured can not be predicted.

Measuring DCV

- Set the range selector knob to an appropriate DCV range.
- Apply the black test pin to the negative potential, and the red test pin to the positive potential of the circuit.
- Read the movement of the pointer by V and A scale.

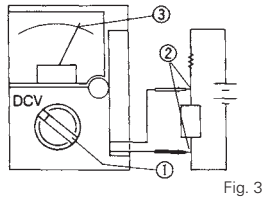
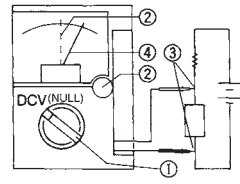


Fig. 3

Measuring ±DCV (NULL)

- Set the range selector knob to an appropriate ±DCV (NULL) range.
- Turn the 0 Ω • adjuster so that the pointer may align exactly to 0 by ±DCV scale.
- Apply the black test pin to the negative potential side, and the red test pin to the positive potential side of the circuit.
- Read the movement of the pointer by ±DCV scale.



MEASURING PROCEDURE

Measuring of I_{ceo} (Leak Current) for Transistor

- Adjust 0 Ω by setting the range selector knob to a proper range from X1 ~ X1 k.
- For NPN transistor, apply a black test lead to the collector and a red one to the emitter.
For PNP transistor, the red one to the collector and the black one to the emitter.
- Determine the leak current by ICEO scale indicated on the scale plate. (Unit in μA, mA)

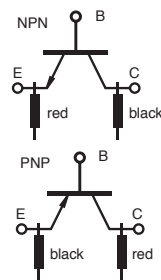


Fig. 9

Measuring of Diode (including LED)

- Adjust 0 Ω by setting the range selector knob to a proper range from X1 (150 mA) ~ X100 k (1.5 μA).
- Apply the black test lead to anode side and the red one to cathode side when measuring I_F (forward current). Apply the black test lead to cathode side and the red one to anode side when measuring I_R (reverse current).
- Read the indicated value by LI scale. (The pointer moves to a considerable extent for I_F, and little extent for I_R)
- The value indicated on LV scale during the measurement is the forward voltage of diode.

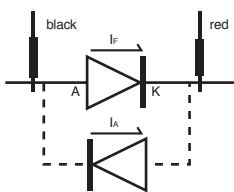


Fig. 10

Measuring ACV ~

- Turn the range selector knob to an appropriate ACV range.
- Apply the test leads to the circuit to be measured.
- Read the movement of the pointer by V and A scale. (Use AC 10 V scale for 10 V range only.)

- Since this instrument provides the mean value system for its AC voltage measurement circuit, AC waveform other than sine wave may cause an error.
- Errors occur under such frequencies other than those in the specification table.

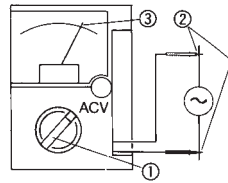


Fig. 4

Measuring DCA

WARNING
Connect the meter in series with the load.

- Turn the range selector knob to an appropriate DCA range.
- Take out the circuit to be measured and apply the black test pin to the negative potential, and the red test pin to the positive potential of the circuit.
- Read the movement of the pointer by V and A scale.

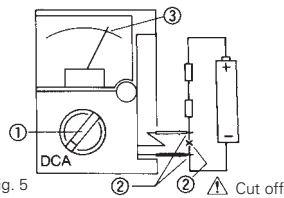


Fig. 5

USAGE OF OPTIONAL PROBES

Usage of High Voltage Probe (HV-10T)

Up to DC 25 kV of CRT anode voltage can be measured by connecting optional HV-10T probe.

WARNING

- Keep the hand (finger) away from high voltage power supply. Electric shock may occur due to discharge.
- Measurement should be limited only to micro current circuits.

- Turn the range selector knob and set it to [HV] PROBE (DC 2.5 V range).
- Connect the jack of the black lead of the probe to the black test pin, and the jack of the red lead to the red test pin.
- Apply the probe clip to the earth side and the measuring pin to the point to be measured.
- Read out measured value on 0 ~ 250 of V scale in kV unit after multiplying it by 0.1.

Usage of h_{FE} PROBE (HFE-6T)

- Set the range selector knob to X10 range ([h_{FE}] PROBE).
- Short circuit both the red and black test pins to adjust 0 Ω.
- Connect the black test pin to the probe jack when a transistor to be measured is NPN, and the red pin to the probe jack for PNP transistor.
- Connect the black clip of the probe to the transistor base and the red clip to the collector.
- Connect the remaining test lead to the emitter and measure h_{FE}.
- Read the indicated value of the meter on h_{FE} scale.

Measuring Ω

WARNING
Do not measure the resistance in a circuit where a voltage is present.

- Turn the range selector knob to an appropriate Ω range.
- Short the red and black test pins and turn the 0 Ω adjuster so that the pointer may align exactly to 0 Ω. (If the pointer fails to swing up to 0 Ω even when the 0 Ω adjuster is turned clockwise fully, replace the internal battery with a fresh one.)
- Apply the test pin to measure resistance.
- Read the movement of the pointer by Ω scale.

Note: The polarity of + and - is reverse to that of the test leads when measurement is done in Ω range.

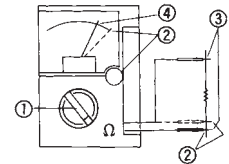


Fig. 6

Note: How to replace battery.

- Loosen the screws fixing the rear case and remove it.
- Replace R6 (UM-3) to fresh dry battery.
- Put back the rear case where it was, and fix it with the screws.

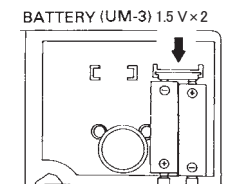


Fig. 7

Note: Be sure to use the same rated fuse. In case a fuse other than the same rate (see "SPECIFICATIONS") is used, an error in indication occurs and/or circuit protection is made unable.

MAINTENANCE

How to Replace the Fuse

If voltage over 100 V is applied to DCA and Ω ranges, the fuse may blow out to protect the circuit.

- Loosen the screws fixing the rear case and remove it.
- Pull the fuse out of holder on the circuit board and replace it.(Fig. 11)
- Put back the rear case where it was and tighten the screws.
- Check and see whether or not indications of respective ranges are normal (check other parts for any failures).

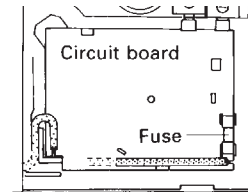


Fig. 11

Storage and Other Precautions

- Avoid giving the meter any excessive shock or vibration by loading it on the motorbike, for instance.
- Keep off dust and moisture from the meter.
- Do not leave the meter for a long time in places of a high temperature (higher than 55 °C), a high humidity (higher than 80 %), and dew condensation.
- The meter cover is treated with antistatic coating. Do not wipe it hard or clean it with volatile solvent. Use a soft brush to remove dust.

Measuring Capacity (C)

- Set the range selector knob to C(μF) .
- Measure the capacitance by applying the test pin to the capacitor to be measured after the 0 Ω adjustment is made in the same manner as in the resistance measurement.
- The pointer moves full scale by the charge current to the capacitor. However, the pointer gradually starts returning to its original position. Read the indicated maximum value on C(μF) scale.

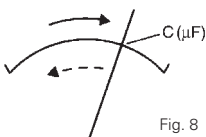


Fig. 8

Note: Be sure to short circuit the both ends of the capacitor for discharge prior to the initial measurement or in such case after the measurement is made.

Note: Pay due attention to the polarity (+ and -) of the capacitor. (Connect + side of the capacitor to - side of the meter.)

Measuring AF Output (dB)

dB (decibel) is measured in the same way as the ACV measurement, but by reading the dB scale instead.

For measurement on the 10 V range, the dB scale (- 10 dB ~ +22 dB) is read directly, but, when measured on the 50 V range, 14 dB is added. On the 250 V range, 28 dB is added to the reading on the scale, and on the 1000 V range, 40 dB added.

Thus, the maximum dB readable is 22 + 40 = 62 (dB) measured on the 1000 V range.

Note: Cut direct current with a capacitor of 0.1 μF or more when measuring such signal as having direct current.

AFTER - SALES SERVICE

Warranty and Provision

Under Sanwa's general warranty policy, each instrument is warranted to be free from defects in workmanship or material under normal use for the period of one (1) year from the date of purchase.

This warranty policy is valid within the country of purchase only, and applied only to the product purchased from Sanwa authorized agent or distributor.

This warranty does not apply to fuses, disposables batteries, or any product or parts, which have been subject to one of the following causes:

- A failure due to improper handling or use that deviates the instruction manual.
- A failure due to inadequate repair or modification by people other than Sanwa service personnel.
- A failure due to causes not attributable to this product such as fire, flood and other natural disaster.
- Non-operation due to a discharged battery.
- A failure or damage due to transportation, relocation or dropping after the purchase.

Repair

Please contact Sanwa authorized agent/distributor/service provider, listed in our website, in your country with your information.

SANWA web site

http://www.sanwa-meter.co.jp
E-mail: exp_sales@sanwa-meter.co.jp