

OPERATION MANUAL

CALIBRATOR FOR W.TESTER

MODEL TOS1200

KIKUSUI ELECTRONICS CORPORATION

KIKUSUI PART NO. Z1-211-020  
IA002292

882001

# Power Requirements of this Product

Power requirements of this product have been changed and the relevant sections of the Operation Manual should be revised accordingly.

(Revision should be applied to items indicated by a check mark )

Input voltage

The input voltage of this product is \_\_\_\_\_ VAC,  
and the voltage range is \_\_\_\_\_ to \_\_\_\_\_ VAC. Use the product within this range only.

Input fuse

The rating of this product's input fuse is \_\_\_\_\_ A, \_\_\_\_\_ VAC, and \_\_\_\_\_.

### WARNING

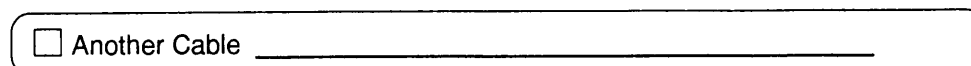
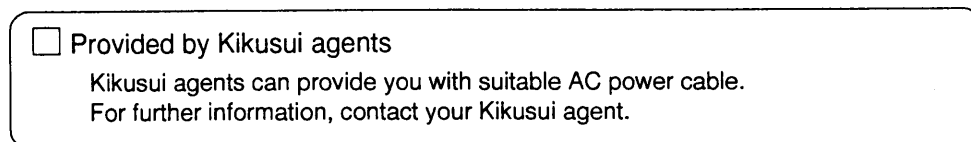
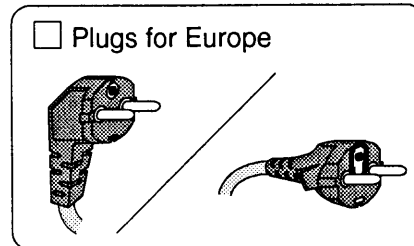
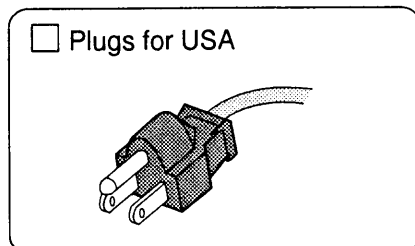
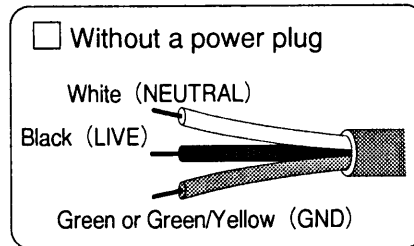
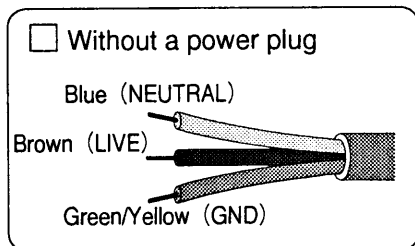
- To avoid electrical shock, always disconnect the AC power cable or turn off the switch on the switchboard before attempting to check or replace the fuse.
- Use a fuse element having a shape, rating, and characteristics suitable for this product. The use of a fuse with a different rating or one that short circuits the fuse holder may result in fire, electric shock, or irreparable damage.

AC power cable

The product is provided with AC power cables described below. If the cable has no power plug, attach a power plug or crimp-style terminals to the cable in accordance with the wire colors specified in the drawing.

### WARNING

- The attachment of a power plug or crimp-style terminals must be carried out by qualified personnel.



## TOS Series Errata

KIKUSUI changed models in the following table to new models.

If the previous model names are described in this manual, read this manual replacing the previous model names with new model names.

Product	Previous Model	New Model
Resistance Box /UL	S P E C 8 3 9 0 3	R L 0 1 - T O S
Remoto Control Box	9 1 3 A	R C 0 1 - T O S
Remoto Control Box	9 1 4 A	R C 0 2 - T O S
H.V Test Probe	H T P - 1.5 A	H P 0 1 A - T O S
H.V Test Probe	H T P - 3 A	H P 0 2 A - T O S
H.V Test Probe	H P 0 1 - T O S	H P 0 1 A - T O S
H.V Test Probe	H P 0 2 - T O S	H P 0 2 A - T O S
High Voltage Test Leadwires	H T L - 1.5 W	T L 0 1 - T O S
High Voltage Test Leadwires	H T L - 3 W	T L 0 2 - T O S
High Voltage Test Leadwires	H T L - 1.5 W H	T L 0 3 - T O S
High Voltage Test Leadwires	H T L - 1.5 R	T L 0 4 - T O S
High Voltage Test Leadwires	H T L - 1.5 I	T L 0 5 - T O S
High Voltage Test Leadwires	H T L - 1.5 D	T L 0 5 - T O S
Warning Light Unit	9 2 0 2	P L 0 1 - T O S
Warning Light Unit	9 2 0 2 S	P L 0 1 - T O S
Buzzer Unit	9 2 0 3	B Z 0 1 - T O S
Buzzer Unit	9 2 0 3 S	B Z 0 1 - T O S

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## 1. GENERAL

The TOS1200 Calibrator is a milliammeter which is used to calibrate the leakage current detecting sensitivity of a Withstanding Voltage Tester. The TOS1200 has built-in load resistors for test.

The measuring ranges of the milliammeter are 0.5, 1, 2, 5, 10, 20, 50, and 100 mA (or 0.8 times of each of these ranges). The main scale of the ammeter is for ERROR indication of  $\pm 10\%$ , with each of the above-mentioned range values as the center of scale. When the leakage current detect range of the Withstanding Voltage Tester is set in a 1-2-5 sequence (or at 4 mA or 8 mA), deviation from the center value can be directly read on the main scale. The auxiliary scale, on the other hand, is for RATIO indication with its full scale 1.1 times of each of the above-mentioned range values, to cover the values beyond those covered by the main scale.

The built-in load resistors are automatically selected as the milliammeter ranges are selected. The resistances of the resistors are such that they give the current values selected by the CUTOFF CURRENT selector switch on the front panel when the test voltage is 1000 V (800 V\*).

\*: The voltage enclosed in the parentheses is for a case that the milliammeter sensitivity is set at 0.8 times of that when in the 1-2-5 sequence, for 1-2-4-8 sequence bit check of a Withstanding Voltage Tester of a type that its detecting current sensitivity can be digitally set.

## 2. SPECIFICATIONS

Measuring Function: Current measurement, at test voltage 1000 V (800 V\*),  
50/60 Hz AC or DC

Milliammeter Ranges: 0.5, 1, 2, 5, 10, 20, 50, and 100 mA (or 0.8 times of  
these ranges)

### Milliammeter Scale

Main Scale: ERROR scale, for  $\pm 10\%$  deviation, with each of the  
above-mentioned range values as center of scale

Auxiliary Scale: RATIO scale, for a range of 0 to 1.1 times of each of  
the above-mentioned range values

### Ammeter Accuracy

Main Scale:  $\pm 1\%$  of reading

Auxiliary Scale:  $\pm 3\%$  of the above-mentioned range values as center of  
scale for 0 - 0.9;  
 $\pm 1\%$  of the above-mentioned range values as center of  
scale for 0.9 - 1.1

Ammeter Indication: For AC, calibrated for sine wave rms value, with mean  
value response

$\pm 1\%$  of full scale.

### Load Resistances

Range [mA]	Resistance [k $\Omega$ ]
0.5	2000
1	1000
2	500
5	200
10	100
20	50
50	20
100	10

Note: The resistances shown in the above table are  
equivalent resistances between the HIGH and LOW  
input terminals when the test voltage is 1000 V.

Resistance Accuracy:  $\pm 1\%$  of nominal resistance

Maximum Allowable Input Voltage: 1100 V, AC or DC

Allowable Input Duration

0.5/1/5 mA Ranges: Continuous

10/20/50/100 mA Ranges: 60 sec., with duty ratio not greater than 1/3

Ambient Temperature and Humidity

To meet performance specifications: 5 to 35°C (41 to 95°F), 20 to 80% RH

Maximum Operable Ranges: 0 to 40°C (32 to 104°F), 20 to 80% RH

Power Supply: None

Overall Dimensions

Excluding Extrusions: 134W × 164H × 270D mm  
(5.28W × 6.46H × 10.63D in.)

Including Extrusions: 140W × 190H × 310D mm  
(5.51W × 7.48H × 12.20D in.)

Weight: Approx. 3.5 kg (7.7 lbs)

Accessories: HTL-1.5R High Voltage Test Leadwires ... 1 set

Operation Manual ..... 1 copy

### 3. GENERAL NOTES AND PRECAUTIONS

#### 3.1 Unpacking and Inspection

Immediately upon receipt of the device, inspect it for any damage which might have been sustained while in transportation. If any signs of damage are found, immediately notify the bearer and/or the dealer.

#### 3.2 Notes and Precautions

- Although the TOS1200 Calibrator itself does not generate any high voltage, it is connected to a Withstanding Voltage Tester which generates a hazardously high voltage of 3 - 10 kV. In order to guard against electric shock hazards, be sure to observe the instructions and precautions given below and in the instruction manual for the withstanding voltage tester.
- (1) Make sure that the GND terminal of the withstanding voltage tester to be calibrated is securely connected to an earth line. If this grounding is imperfect, the calibrator may be charged up to high voltage when the output is shorted to the ground line or the power line, and electric shock hazards can result.
- (2) The connection method of the test leadwires of the GND side is shown in Figure 3.1. Make sure that the GND leadwires has no discontinuity. Unless the leadwires is securely connected, the calibrator can be charged up to the high voltage.

Note: The larger wire clamp is for the withstanding voltage tester and the smaller one is for the calibrator.



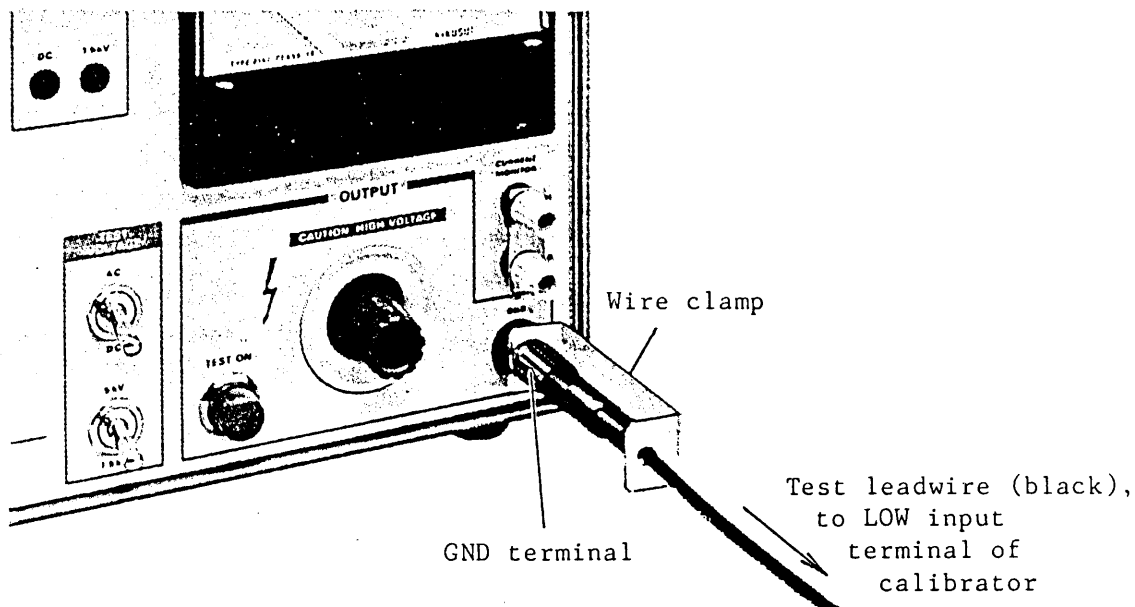


Figure 3.1

- (3) Be sure to wear rubber insulating gloves whenever operating this device in order to guard against electric shocks.
- (4) Never touch the test leadwires, input/output terminals or other parts which are charged up to the high voltage when the withstanding voltage tester is in the TEST ON state.
- (5) Before touching the test leadwires or the input/output terminals, make sure that the output voltmeter of the withstanding voltage tester is indicating 0 (zero) and that the TEST LAMP of the tester is off.

In addition to the above, when the equipment is operated in the DC mode, short once between the output terminals (HOT line and GND line) with the test leadwire of the GND line.

- (6) When in an emergency, immediately turn off the power switch of the withstanding voltage tester and disconnect the AC power cable from the line power receptacle.

For the calibrator, observe the following:

- (1) Do not operate or store the calibrator in direct sunlight, high temperature, high humidity, and/or dusty atmosphere.
- (2) The maximum allowable input voltage of the calibrator is 1100 V (AC or DC). Do not apply to the calibrator any voltage higher than this.

## 4. OPERATION METHOD

### 4.1 Description of Front Panel

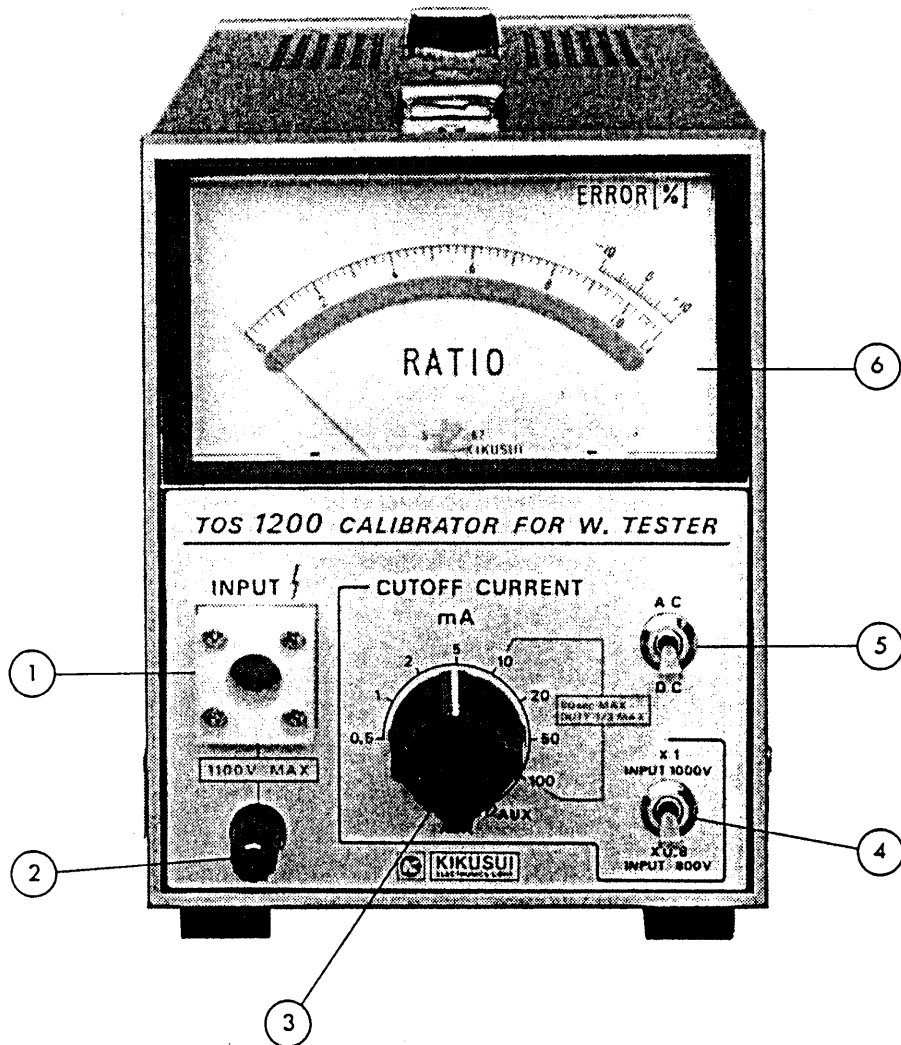


Figure 4-1 Front Panel of TOS1200

- ① INPUT Terminal: HOT-line input terminal for test voltage.
- ② INPUT Terminal: GND-line input terminal for test voltage.
- ③ CUTOFF CURRENT Range Switch: Selects a current range of the milliammeter. When the  $\times 1/\times 0.8$  switch is set at " $\times 1$ " and a current of the value selected by the CUTOFF CURRENT range switch flows in the TOS1200, its main scale reads "0" (its auxiliary scale reads "1.0").

- ④  $\times 1/\times 0.8$  Multiplier Switch: Selects a multiplication factor for current measurement. When the switch is set at " $\times 1$ ", the current measuring sensitivity is as selected by the CUTOFF CURRENT range switch. When it is set at " $\times 0.8$ ", the sensitivity is 0.8 times of that selected in the above.
- ⑤ AC/DC Switch: Select the type (AC or DC) of the test voltage.
- ⑥ Milliammeter: Indicates the measured current. The main scale is for  $\pm 10\%$  ERROR indication (deviation indication) with the value selected by (3) CUTOFF CURRENT Range Switch (3) and  $\times 1/\times 0.8$  Multiplier switch (4) as the center value. The auxiliary scale is for "0 - 1.1" RATIO indication with the value selected by the above switches as "1.0".

#### 4.2 Description of Rear Panel

- ⑦ GND: For grounding the calibrator to an earth line. Be sure to connect the GND terminal to an earth line where operating the calibrator.

#### 4.3 Operating Instructions

- Be sure to observe the following instructions before starting operating the calibrator.
- (1) Make sure that the notes and precautions give in Section 3.2 are fully observed. Then, make preparation as described in the following paragraphs.
  - (2) Connect the GND terminal of the calibrator to an earth line.
  - (3) Check that the milliammeter pointer is at the "0" scale position. If it is not at the "0" position, adjust it to the "0" position with the "0" control located at the center of the meter.

- (4) Connect the input terminal of the calibrator to the output terminals of the withstanding voltage tester as follows:  
First, connect the GND terminals with the black test leadwire as shown in Figure 3.1. Securely fix the wire clamp with the GND terminal knob. Next, connect the HOT line terminals with the red test leadwire. Securely fix the leadwire to the HOT line terminal of the calibrator with the plastic screw which accompanies the calibrator.

Measuring Procedure

(1) AC/DC Setting

Set the AC/DC switch of the calibrator in conformity with the output mode (AC or DC) of the withstanding voltage tester. If the AC/DC switch is set wrongly, although the calibrator will not be damaged, the ammeter reading is seemingly correct but actually is incorrect.

(2) Setting the Leakage Current Detect Reference Value ... In 1-2-5 Sequence

Set the leakage current detect reference value for the calibration point, with the switch on the front panel of the withstanding voltage tester. Next, set the CUTOFF CURRENT range switch of the calibrator to the position for the same current. Set the  $\times 1/\times 0.8$  switch to the " $\times 1$ " position.

(3) Setting the Leakage Current Detect Reference Value ... In 1-2-4-8 Sequence

When the reference value setting is in the digital system and calibration is to be made at 4 mA or 8 mA, proceed as described below. (Even when reference value setting is in the digital system, if the calibration point is 1, 2, 10 or 20 mA, calibration should be made as described in Step (2) above.)

First, set the  $\times 1/\times 0.8$  switch to the " $\times 0.8$ " position. As the switch is set to this position, the milliammeter reading is with a multiplication factor of 0.8 for all of the ranges selectable with the CUTOFF CURRENT range switch.



For calibration with the RATIO scale, set the  $\times 1/\times 0.8$  switch to the " $\times 1$ " position at first. Next, set the CUTOFF CURRENT range switch at the range closest to but not smaller than the current at which the tester is to be calibrated. In the same manner as in Step (4), read the value on the RATIO scale at the instant the tester has generated an NG signal. The measured current value can be known by multiplying the reading on the RATIO scale by the range value selected by the CUTOFF CURRENT range switch.

Example:

CUTOFF CURRENT Range Switch:	10 mA
$\times 1/\times 0.8$ Multiplier Switch:	1
RATIO Scale Reading:	0.59
Measured Current Value:	$10 \text{ mA} \times 0.59 = \underline{5.9 \text{ mA}}$

(6) Heat Dissipation Capacity of Internal Load Resistors

The heat dissipation capacity of the internal load resistors of the calibrator is only one-third of the heat generated by them when the calibrator is operated at the 10 mA - 100 mA ranges. The resistors are over-rated thus from the viewpoint of the size, weight and cost of the calibrator. Therefore, to meet the specified performance accuracy of the calibrator, it should be operated within the following restrictions:

Maximum continuous current period: 60 sec.

Duty cycle ratio: Not greater than  $1/3$

Examples: After the current is fed continuously for 20 seconds, a pause period of 40 seconds should follow; after the current is fed continuously for 50 seconds, a pause period of 100 seconds should follow. The current must not be fed continuously for more than 60 seconds. When ranges are changed, however, the periods for the new range alone is required to be considered and those of the old range need not be considered.

The calibrator will not be readily damaged even when it is operated exceeding the above heat dissipation capacity. Note, however, that the internal temperature of the calibrator may become high and the resistor and other components of the calibrator may be degraded. Be sure to operate the calibrator within the above heat dissipation capacity. This does not apply, however, to the 0.5 - 5 mA ranges.

## 5. OPERATING PRINCIPLES

### 5.1 Block Diagram of TOS1200

A block diagram of the TOS1200 is shown in Figure 5.1.

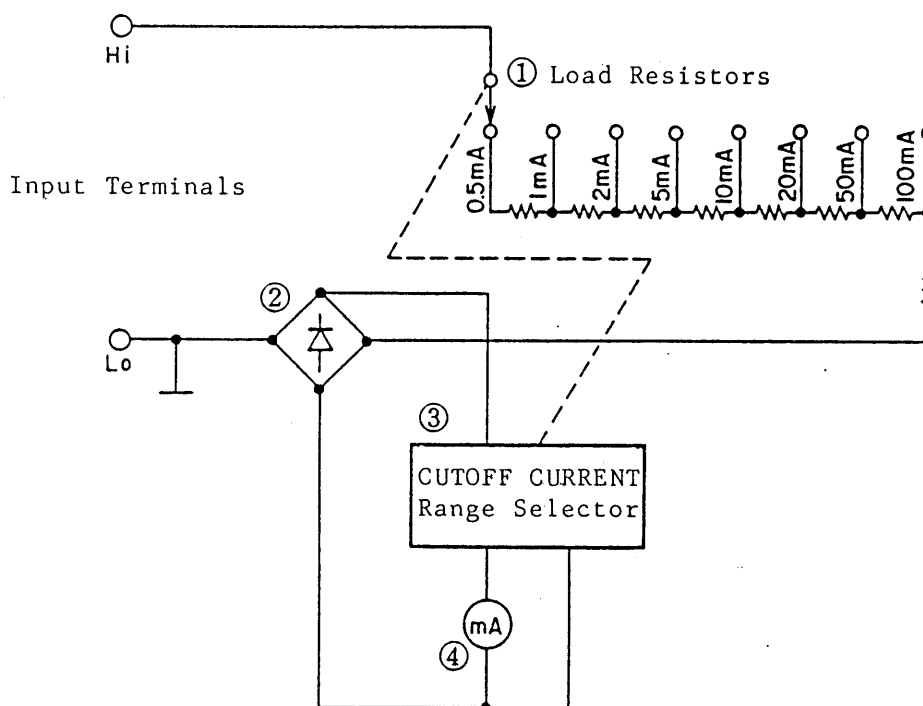


Figure 5.1

### 5.2 Description of Components

- |                                  |  |
|----------------------------------|--|
| ① Load Resistors:                | Provide resistances to limit the current at the required values when the test voltage is 1000 volts (800 volts when the $\times 1/\times 0.8$ switch is set at the " $\times 0.8$ " position). The resistors are automatically selected as the CUTOFF CURRENT range switch is changed. |
| ② Rectifier:                     | A full-wave rectifier to drive the DC milliammeter.  |
| ③ CUTOFF CURRENT Range Selector: | Selects a current measuring sensitivity of the calibrator.   |
| ④ Milliammeter:                  | Indicates the measured current.  |