INSTRUCTION MANUAL FOR

DC CURRENT STANDARD

MODEL 105

KIKUSUI ELECTRONICS CORP.

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.

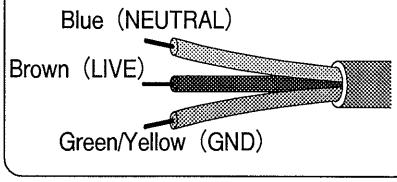
☐ AC power cable

The product is porvided 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.

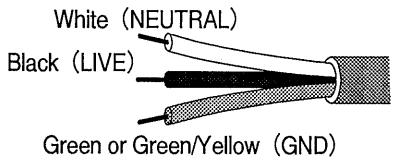
WARNING

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

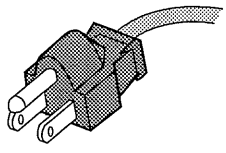
☐ Without a power plug



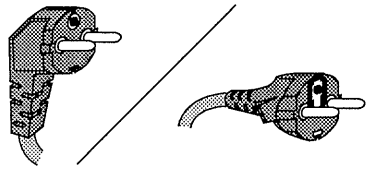
☐ Without a power plug



☐ Plugs for USA



☐ Plugs for Europe



☐ Provided by Kikusui agents

Kikusui agents can provide you with suitable AC power cable.
For further information, contact your Kikusui agent.

☐ Another Cable _____

 Kikusui Part No. Z9-000-027 IB001681

KIKUSUI

TABLE OF CONTENTS

1. GENERAL

The Kikusui Model 105 DC Current Standard is a high stability current supply which provides a current of 0 - 100 mA at an accuracy of 0.05% in conformi with the dial setting.
Maximum output voltage can be adjusted to 0 - 100 V.
Output characterisitic is constant current-voltage crossover type.
Output charaeteristic becomes to constant voltage mode when output voltage becomes to setting value.
The current setting is made with three digit dials, a vernier dial, and range switch (1 mA 10 mA 100 mA)
Dials are movable between 0 - 11. Since the center dial (least significant column) are continuously rotatable through 0 - 11 - 0. It is easily made to taking a figure up are place. Constant current is minutely continuously variable from 0 to minimum digit (1) with the FINE knob.

Maximum output voltage is continuously variable from 0 to 100 V. This equipment to be used as stably constant voltage supply, when output current is a value less than setting value.

The 105 is used for calibration of convartional DC ammeters, as a power source for a semiconductor, as aprecision power source for potent ionethy, for research and inspection, for quality control for maintenance of electronic apparatus, and for other various purposes.

2. SPECIFICATION

Output current	0 - 122.20 mA
Dial	0 - 11 0 - 11 0 - 11 0 - 10
Accuracies	Less than 0.02 % of range or 0.05 % of setting whichever is greater
Load regulation	Less than 0.015 % of range against 1 - 80 % load change (at maximum)
Line voltage regulation	Less than 0.003 % of range for a 10 % line voltage from nominal
Ripple and noise	(5Hz - 1MHz) (rms) Filter OFF less than 0.0003 % of range Filter ON less than 0.0001 % of range
Overload protection	Automatic crossover type
Over voltage protection	Approx. 0 - 100 V (output mode becomes to constant voltage when output voltage becomes to setting value)
Output voltage	Approx. 0 - 100 V
Load regulation	Less than 0.25% against 0 - 80 % change (at maximum output)
Line voltage regulation	Less than 3mV for a 10 % line voltage from nominal
Ripple and noise	(5Hz - 1MHz) Filter OFF less than 500 V rms
Output current	0 - 122.20 mA (output mode becomes constant current when output current becomes to setting value)
Ambient temperature	0°C - 40°C (specification performance guarantee range .... 25°C 10°C)
Power requirements	____ AC, 50/60 Hz, approx. 35 VA
Dimensions	200 mm (W), 140 mm (H), 320 mm (D) 200 mm (W), 160 mm (H), 355 mm (D) max.
Weight	Approx. 6 Kg
Accessories	Short bar ..... 1 Instruction manual 1

3. OPERATION PROCEDURE

3.1 EXPLANATION OF FRONT AND REAR PANELS (See Figs. 3-1 and 3-2.)

(1) POWER: Pushbutton-type alternate-action power switch. When this switch is depressed and locked, the power is turned on and the power pilot lamp lights.

(2) RANGE: Range selection switch knob. The scale figures denote the maximum values of respective ranges. As the knob position is changed, the decimal point also is changed accordingly.

(3) OUTPUT CURRENT SETTING DIALS: The set value of the output current increases as three dials are turned clockwise. The left-end dial (the most significant column) is movable between 0 - 11. The center dial and right-end dial (least significant column) are continuously rotatable through 0 - 11 - 0.

(4) VERNIER: The full variation (from 0 to 10) of this dial corresponds to the unit variation (variation by 1) of the least-significant column dial. Since efficiency of this dial is less than approximately 2 %, efficiency in minimum range (1 mA) is less than approximately 20 mA.

(5) VOLTAGE: In constant current mode, maximum output voltage is varied from 0 to 100 V by this knob. Efficiency is less than approximately 0.15 V. This knob corresponds to output voltage control knob on constant voltage mode.

(6) CV: A LED lights when output mode changes to constant voltage from constant current.

(7) FILTER: Turn this switch to 'ON' and a capacitor (10uF) is connected parallel with output terminals. Although response becomes slow for the capacitor, effect by induction from outside extremely decrease, because of reduction of noise in output and low output impedance.

(8) OUTPUT: (Standby switch)
When this switch is turned down wards output is turned OFF. By turned upwards, output is provided to output terminals.

(9) OUTPUT: Output terminals, these terminals provide a DC current of 0 - 122.2 mA or a DC voltage of 0 - 100 V.
The red terminal is positive side, and brack terminal is a ground terminal which is connector to the case.

(10) FUSE: Connected in the primary circuit of the power transformer. The fuse is removable by turning the bracket counterclockwise.

(11) POWER CORD: To be connected to an outlet of an AC line of
V, 50/60 Hz.

(12) CORD RETAINER: The power cord is wround on this retainer for storing the Standard.

(13) POWER TRANSISTOR: Be careful not to touch this transistor, because high voltage is provided to this transistor.

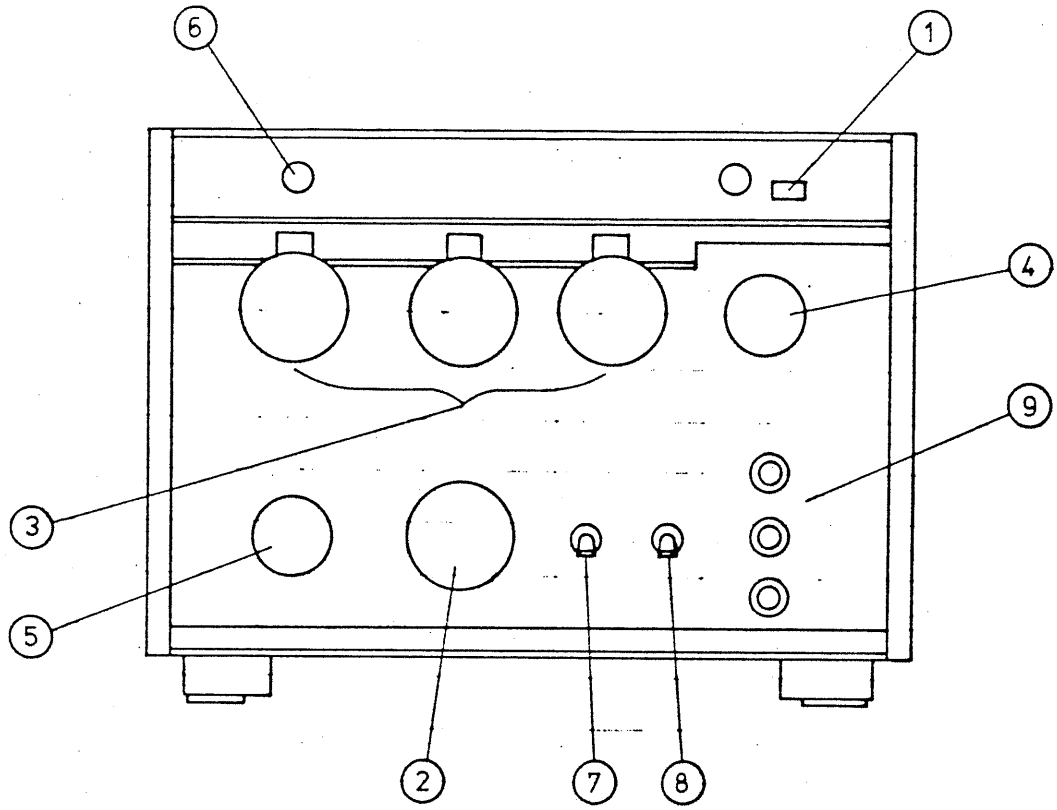


Fig. 3-1

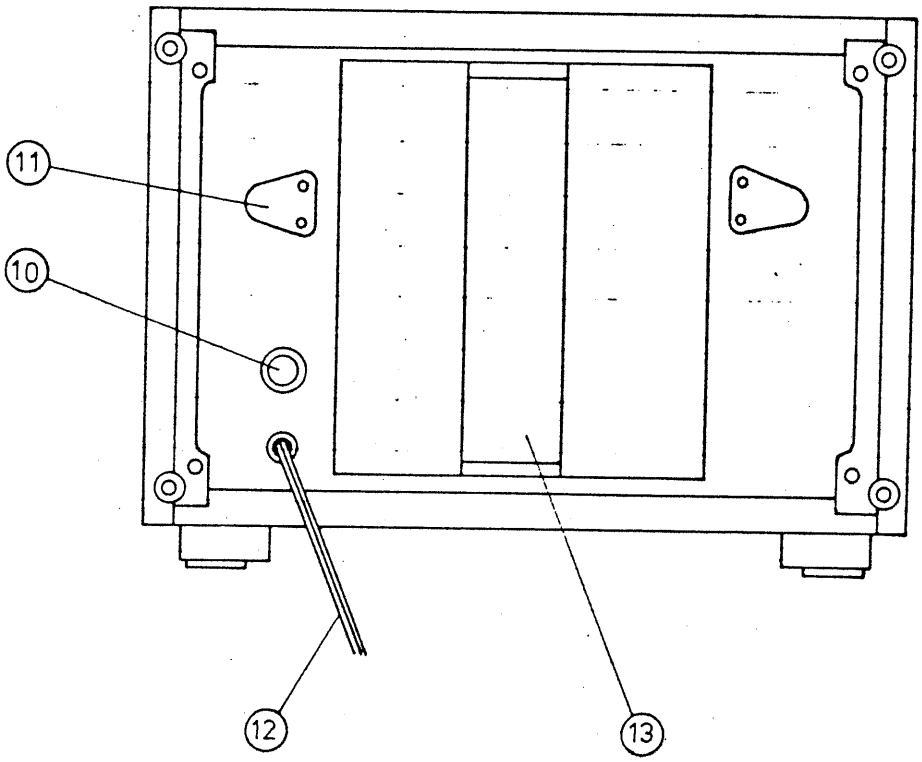


Fig. 3-2

3.2 PREPARATIONS FOR OPERATION

(1) Set the OUTPUT CURRENT SETTING DIAL and OUTPUT VOLTAGE setting knob in the 0 position, and set the OUTPUT switch and POWER switch in the OFF position.

(2) Connect the POWER cord to an outlet of an AC line of _____V 50/60 Hz, and turn on the POWER switch.

(3) When a high setting accuracy is required, allow a sufficient stabilization preiod after turning on the power. When no high accuracy is required, the Standard may be used in 30 minuits or over after turning

(4) Set the RANGE switch and OUTPUT VOLTAGE setting knob in the value required, and connect a load.

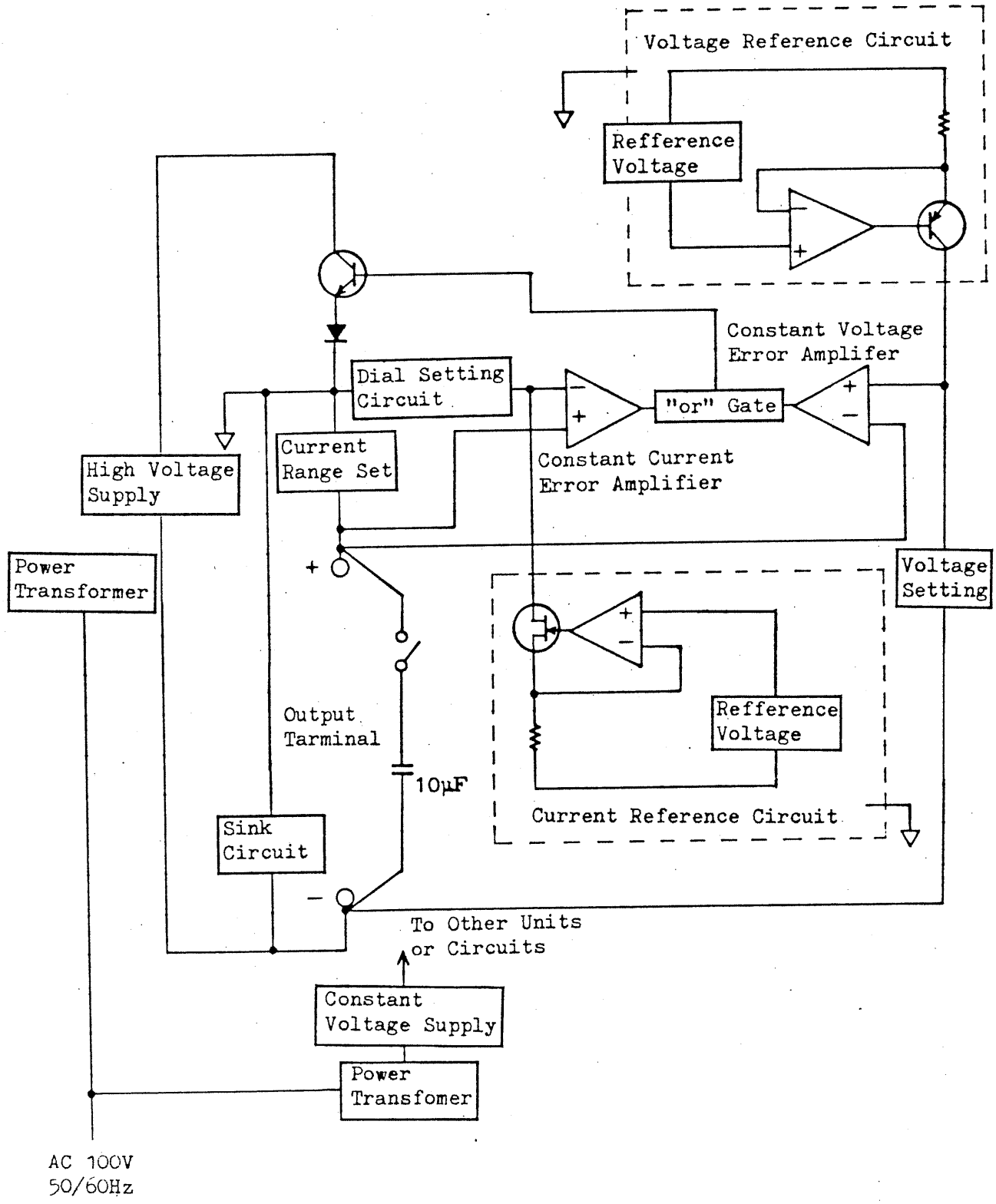
(5) Turn the OUTPUT switch to ON. Output will be provided to the load.

(6) On constant current mode, over voltage is restricted by setting of the OUTPUT VOLTAGE knob on constant voltage mode, over current is restricted by setting of the OUTPUT CURRENT.

(7) At no load, response is slow, when the OUTPUT CURRENT setting is very small and the FILTER is ON.
(This characterisitic is occured with a capacitor of 10uF accross the OUTPUT terminals)

4. OPERATING PRINCIPLE

A block diagram of the Model 105 Current Standard is shown in Fig. 4-1.



This circuit is constant current-voltage crossover type. It operates as constant current source, if output voltage is less than setting output voltage, and as constant voltage source if output current is less than setting output current.

On constant current mode, constant current error anplifier is electrically connected to the control transistor with gate circuit, and constant voltage error amplifier is disconnected.
A stable constant current (Irl) flows in a reference constant current source for constant current through a current setting circuit which is composed of resistances, and a voltage drop (Vd) is represented across the circuit. Constant current error amplifier operates so that the voltage between input terminals becomes to 0 volts. It turns the control transistor to ON, and current from high voltage source flows in it. It makes the voltage across the resistor for current range (Resistance R2) to same voltage as Vd.
Constant current Vd/R2 is produced in output terminals, when the resistor for current range is constant.
When resistance of current setting is Rl,output current Io is represented as follows.

$$Io = Rl \cdot Irl/R2$$

When the voltage drop across a load resistance by output current is setting value of constant voltage, constant voltage error amplifier operated instead of constant current error amplifier by means of gate circuit.

A constant current (Ir2) produced by reference constant current source for constant voltage flows in a voltage setting circuit (R3) which is composed of resistances, a voltage drop is represented across the circuit (R3) by constant current Ir2. A constant voltage error amplifier operates so that the voltage between input terminals becomes to 0 volts. As the negative input terminal is connected to the positive output terminal, the voltage drop across the voltage setting circuit is equal to output voltage.

$$\text{Output voltage } Vo = R3 \cdot Ir2$$

This equipment operates as described above.

5. MAINTENANCE

5.1 ACCESS TO INTERNAL COMPONENTS

To gain access to the internal components of the Standard, remove the four clamping screws shown in Fig. 5-1 and slowly pull backwards both side panels, top panel, and bottom panel.

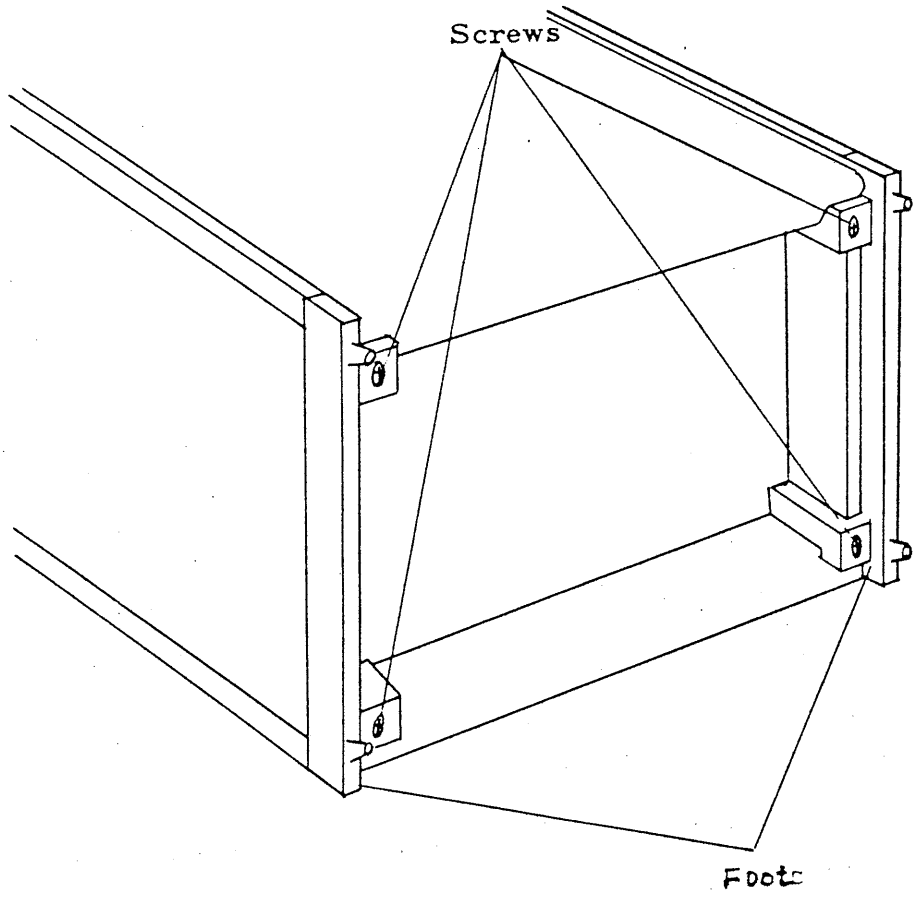


Fig. 5-1

Note: If the housing is inclined to this side by holding the handles under the state that the foots of the rear panel are removed, the top panel will come off the frame. Do not incline the housing under such state.